Primitive

Tools

Making and using them

by John & Geri McPherson

TOOLS FROM STONE *(BASIC FLINTKNAPPING AT ITS SIMPLEST)*, BONE, ANTLER, WOOD, SHELL
--- NATURAL TOOLS MADE NATURALLY ---
--- HOW TO USE THEM ... A BOW IS MADE FROM START TO FINISH USING ONLY THE TOOLS MADE IN THIS BOOK.
PROFUSELY ILLUSTRATED WITH PHOTOGRAPHS.
THIS REALLY DOES WORK!!!

NINTH IN A SERIES

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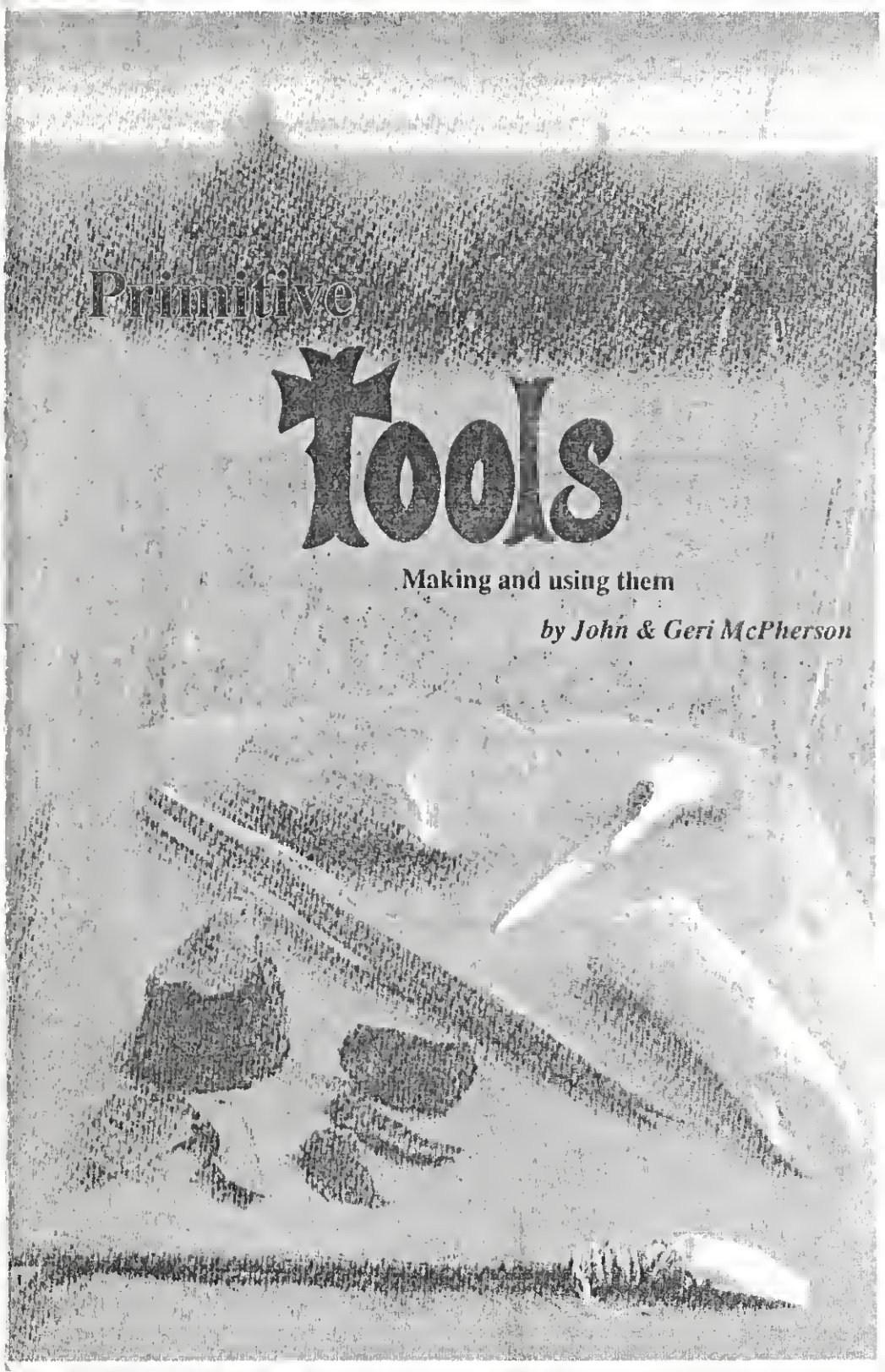

HANTAVIRUS WARNING!

The above virus is* fatal *in humans.
It is spread through contact with deer mice and possibly other rodents - most notably through the breathing of the (dust?) of their scat or droppings but also possibly through other contacts. In some of our literature we have spoken of trapping and eating mice and other rodents. **We now advise against this practice.**

For information on other books and videos pertaining to primitive wilderness living and survival skills contact;

Prairie Wolf
John & Geri McPherson
POB 96
Randolph, KS 66554

"This is without doubt the best training guide for real primitive living skills"
Museum of the Fur Trade Quarterly.

"... if civilization ends and you can carry only one object away with you, make sure it's this book."
Tim Baker, Master Primitive Bowyer, Oakland, CA

"--- the best, --- only books I have reviewed that actually work. Too many survival books are written by just copying someone else's work and in this way many mistakes, sometimes dangerous ones, are perpetuated. If you are going to purchase a survival book, get this one. I recommend it."
Keith Burgess, outdoor writer and book reviewer, Australia

"The McPhersons' book --- deals with taking flat nothing into the boondocks and staying there for a long period of time. If you'd like to know how to make a spear thrower, or pottery, or brain cure deer hides, or build a permanent shelter from what you find at hand, here is the place to learn."
Field & Stream

"I have bought all eight of the previous volumes in your series, and use them regularly in teaching prehistoric/aboriginal technology to my students at Harvard. They are easily the most practical guides to this subject that I have ever seen."
Prof. John S., Dept. of anthropology, Harvard University.

Primitive Tools

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by John & Geri McPherson

POB 96, Randolph, KS 66554

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INTRODUCTION

Up to now in this series of books we have covered the majority of projects and/or skills necessary for one to live pretty well in comfort in a primitive wilderness situation. But, for the most part we have been using modern tools to do this. What's the purpose of learning a complete series of ***primitive*** wilderness living skills if one has to resort to modern technology to accomplish them?

Several have asked prior to this about the ***primitive*** tools necessary ... just why were they saved until last? Well, I guess that it's just our way of teaching. We instruct students here at home in the skills. The skills alone are at times difficult enough to master. We feel, learn the skills, then learn how to do them the hard way.

Hard way? ... well as you'll see in this presentation, hard is the wrong description. Different is the word. Different and more time consuming. But in adapting primitive to our life-styles aren't we trying to get away a little from the time consuming tasks of ordinary life?

Learning to make and use primitive tools in a day to day situation really isn't hard ... but we feel that if one is trying to learn to master not only making tools but also changing your accepted approach to using these tools, then a lot of extra time is required and frustrations are encountered. So we teach the skills first, and then how to accomplish them with primitive tools. As you will see, eventually it all just naturally ties together.

Here, in the order that they touched us, are listed the more prominent figures who have influenced us in our tool making ... primarily flintknapping;

Ernie Peck, who first showed me, John, what to do with a nail and a flake in 1974.

George Stewart, who picked Geri and I out of a crowd and sat us down, showing us the wonders of percussion in 1987.

Brian James, who was the first to begin to try to explain some of these mysteries to us.

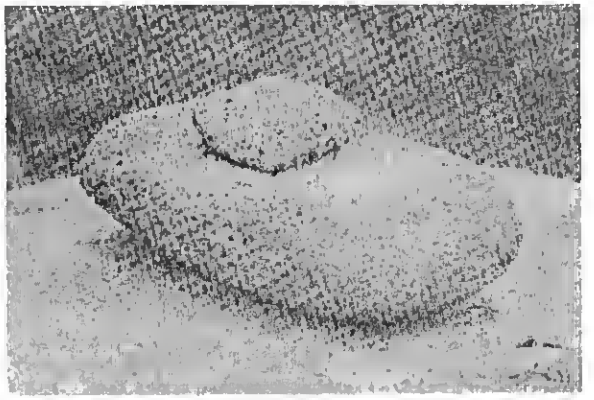
Steve Watts ... a very special person in our lives who shows us something new in primitive skills every time that we encounter him.

The list is not by any means limited to only the above. We have been influenced by many in our never ending search ... these are just the ones who have effected us the most *at various stages of our development*. But, what you need really be aware of, is the fact that ***we ourselves*** made the biggest difference. It was the hundreds, actually *thousands* of hours of *applied practice* that has gotten us to this stage. We say this here only to remind you that you can read everything that you want on any of these subjects, watch all the demonstrations that there are available ... but if you don't just jump right in there and apply yourself, nothing is gonna happen.

A special thanx to our friend ***Jeffrey Schmidt*** who first proofed this and reminded me (John) just what I had been pounding into his head while teaching him the basics.

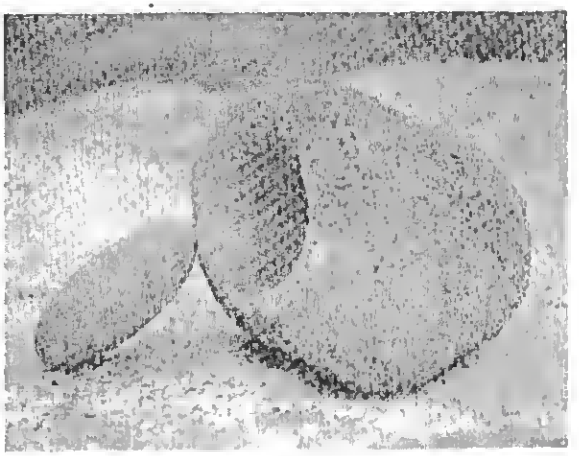
Something often forgotten when speaking of tools are food preparation items. Both the Mano/metate and the mortar/pestle are more than just a little useful when living primitively when it comes to grinding of staple items such as seeds, acorns and corn.

MANO AND METATE



This small metate and accompanying mano of pumice (or basalt?) was made by Geri and I for use in our small camps and demonstrations. The depression was created simply by grinding with the mano.

MORTAR AND PESTLE



The above mortar was made in just a few hours by pecking with the same piece of jasper shown on page 22.

FINIS

So there you have it. You'll note that in the section on flintknapping that there was little to no mention of "arrowheads" or other projectile points. Well, there is a reason for this which I hope that you have picked up on by now ... ***they just aren't that important in primitive living***. A sharpened stick will kill just as certainly as any "arrowhead" **if properly placed** and the making of projectile points is a schooling of its own usually requiring years. The tools that we stress as important require no more time than what it took you to read this book and to take a little sit down to apply.

With the exception of just a few items interspersed, everything was made for the production of this book. The celt and handle required over 12 hours total and the bow took one afternoon to cut and prepare to tying down and an additional belter part of a day to finish out. The majority of the rest were made in one afternoon. This ain't to brag ... just to reinforce to you that this really isn't all that difficult. If we can do it, anyone can.

Since we have a page and a half of white space left over, we'll just show you a few other objects that we have made using the techniques shown in this book.

WOODEN BOWL

This bowl was made from a piece of aspen following guidelines set forth in this book ... stone tools and friction made fires.

Tools

... just what do we mean by tools? ... our *hands* are tools. I suppose that for our definition here we will be making tools for our hands to use to do the projects that we have covered so far in this series ... and that will pretty much encompass any project that one is likely to happen upon in a primitive situation.

1 - They need to be made from materials that one will find in nature ... STONE/SHELL/BONE/ANTLER/HORN/WOOD.

2 - And just what do we need these tools to do? GOUGE OR POKE/CHOP/POUND/BASH/SPLIT and most importantly ... CUT. Put yourself in a primitive situation without a cutting implement of some sort and you'll not do very well.

3- Methods of manufacture; FLINTKNAP/PECK/GRIND/BURN.

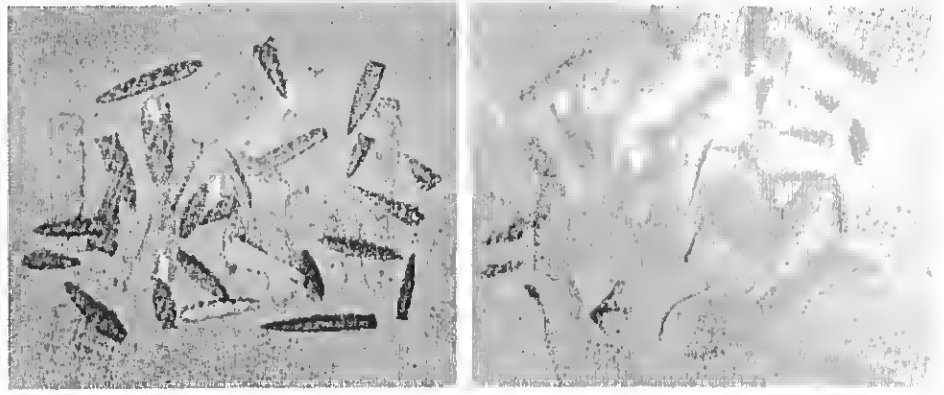
So let me break this down now into some semblance of order (order? ... ha!).

First and most importantly, one needs a cutting tool of some sort ... a pocket knife so to speak. Note all projects that one does in his/her daily regime in the wilds and what tool is the most important? The knife. So we'll begin with what many have been waiting for ...

BASIC FLINTKNAPPING

Now don't look at some of the photo's here of fine blades and put the book down thinking that "I can never do this". Well, you may be right, maybe you can't. But the tool that you are going to need to cut and chop your way into or out of the woods is within your grasp. Read on.

There has been a lot taught and some little written about flintknapping (the art of systematically turning stone, flint, into functional tools). *Some* of what we have seen in print is good ... some little *very* good ... but most is just trash. Almost nothing

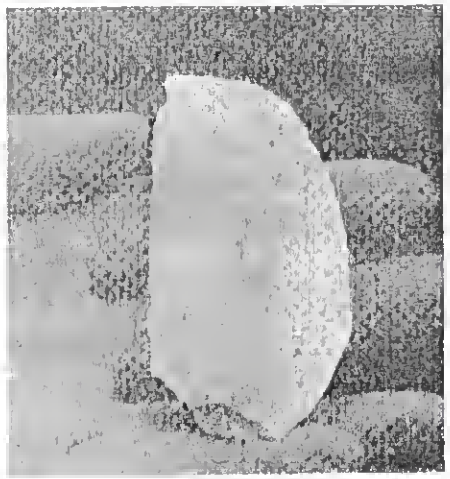


Fancy blades, yes. But in our actual primitive workings they account for probably less than 5% of the actual workload. The easily made flakes (right) do the majority.

generally available to the student of primitive wilderness skills, attends to the very basics ... the most important aspect of knapping ... the obtaining of the spall or flake to be used *as is* for the tool or to be *turned into* a tool. This first basic function of spalling, making the flake ... is the most important part of knapping. Without it one can travel no further. With it one needs to know no more.

Most certainly we have had help from others learning what knapping we know ... but we have found that even the most willing of teachers wasn't answering the questions that we didn't even know we needed the answer to. All who knap certainly have some grasp of what the principles are but they either 1) weren't conscious of what they were doing (it just came naturally ... it worked), 2) they didn't know how to present what they were doing or 3) *they had advanced so far that they had forgotten the importance of the basics.*

A good many of modern flintknappers have learned their skills backwards ... the last step first. I, John, know that I did. Here we start at the beginning.

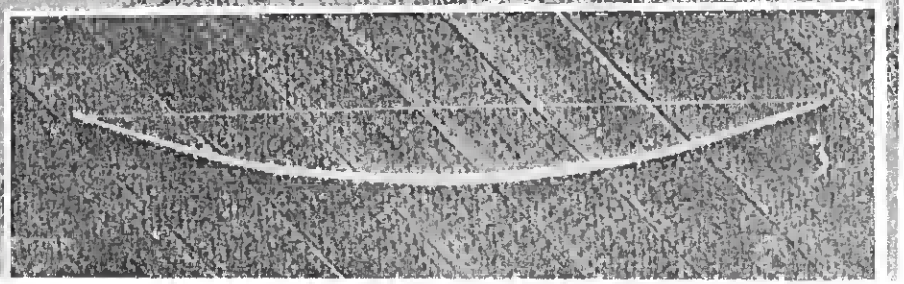


The functional, simple, easy to learn, easy to make, one blow tool.

SAFETY

1) Wear eye protection when working stone. It don't take but one misdirected sharp edge to eliminate sight. 2) Don't breath the dust. Every time that you remove a flake from the stone you will create dust. Once in the lungs, it cuts and creates scar tissue that is there from now on til forever ... and that's a mighty long time. It don't go away like when you quit smoking. Those tiny razor blades do some serious cutting. And the resulting scar tissue will eventually kill you if you breath enough of the dust

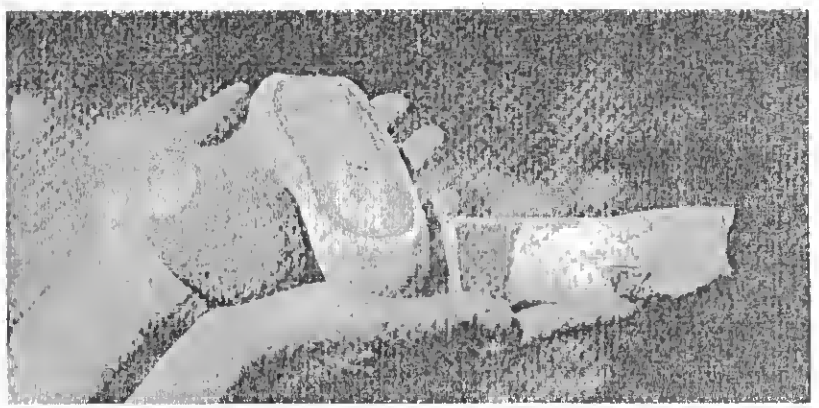
There are any number of positions for you to experiment working in. (Sequence upper left) - Here Geri buries one end of the bow (upper left) into her belly and the other into a secure area in a rock and draws the flake towards her to remove wood shavings in a hurry ... she then (upper right) makes final cut to length with adze and (lower left) shapes up end with a sharp flake before (lower right) cutting notches. (Background and below) The finished bow. For more detailed instructions on the making of bows refer to our book # 3, ***Makin' Meat-1, The Primitive Bow and Arrow*** *in the* ***Prairie Wolf*** *series.*



over a long enough period of time (silicosis). And be aware that the dust not only is in the air, but it also gets into your clothing and whatever. Best don't do it in the house ... outside ... let the wind clear the air for you. Most dust masks won't work ... some will. Something is better than nothing. 3) You're gonna cut yourself. Keep a supply of bandages handy. If you wish, wear gloves or hold the stone you're working with a piece of leather. We don't anymore but we also occasionally still cut ourselves. Also, be cautious of where the falling flake is gonna land. I've more than once driven a flake into my leg. Be cautious and you'll be alright. 4) Don't flintknap (especially the advanced blades) in the company of those with sensitive ears. The accompanying language is similar to that of auto mechanics (Geri learned the words from me long before she became an active knapper).

FLINT

Just what is flint? Well, according to Webster, flint is a form of quartzite ... and the description of quartzite is a bit more complicated ... so lets simplify. We'll lump all the stone that we will work "flint like" into one category and call it flint. As far as I know, there are only two sources of true flint in the United States ... the rest are cherts, jaspers, chalcedonies, agates and just plain quartz. To my way of thinking (here goes my theorizing again) most all of these are just various stages of development or quality of quartzite (as coal is to diamonds). And quartzite cobbles are pretty common, most as close as your local streambed or roadcut. Generally the better quality flints are smooth and have a sheen. The poorer ones are more grainy (as in sandy). Most have an outer coating, sorta like a limestone covering, called the cortex



(Left to Right) 1- Cobble of Dover chert from Tennessee, light brown inside, dark brown cortex. 2- Cobble of chert from flint hills of Kansas. White limestone cortex, dark blue banded ring of high quality chert with lighter colored interior of lesser quality. 3- lens of knife river flint (chalcedony) from North Dakota, rootbeer colored and translucent. White, hard, smooth cortex.

(cortex is the commonly used term ... corticose is the more proper). Cortexes' vary in workability ... some can be left on and used with the tool ... others are too crumbly and will not do the job at hand. This cortex can hide the flint underneath so you will need to do some experimenting to find out just what is what (applying the rules that follow).

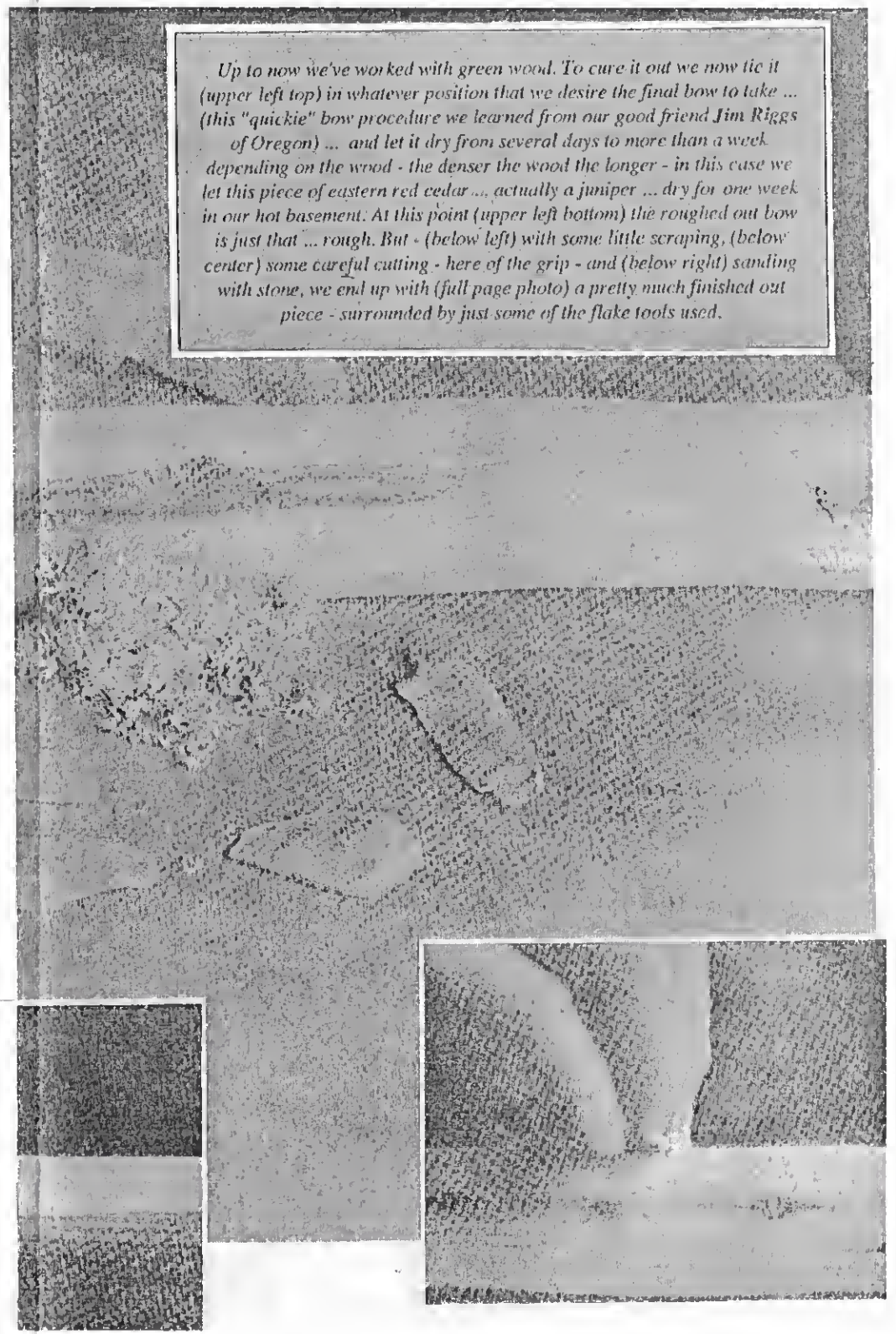
Many of you are familiar with obsidian being used in the making of "arrowheads" and other tools. Obsidian is also workable under the same rules that follow ... it is simply natural glass made by volcanic action. Obsidian is the easiest of these materials to work, it gives the sharpest edge known to man and is great for beginners and advanced knappers. It's drawbacks? ... it's very brittle and *very* dangerous (thousands of tiny dust razor blades to be breathed into your lungs or stuck into your various body parts). Many flintknappers who have not worked obsidian kinda knock those who do work with it because of its ease of workability ... *but most of those knocking it would not be able to turn out a fine, thin, long blade from obsidian without breaking it first.* Here we'll call it all flint and just ignore the obsidian ... tho the principles are the same.

One quality that all these rocks have is that they are homogeneous (of the same composition throughout). Simply put, they are all one ... there is no grain (as in grain in wood) ... energy will travel equally in *any* direction that it is directed.

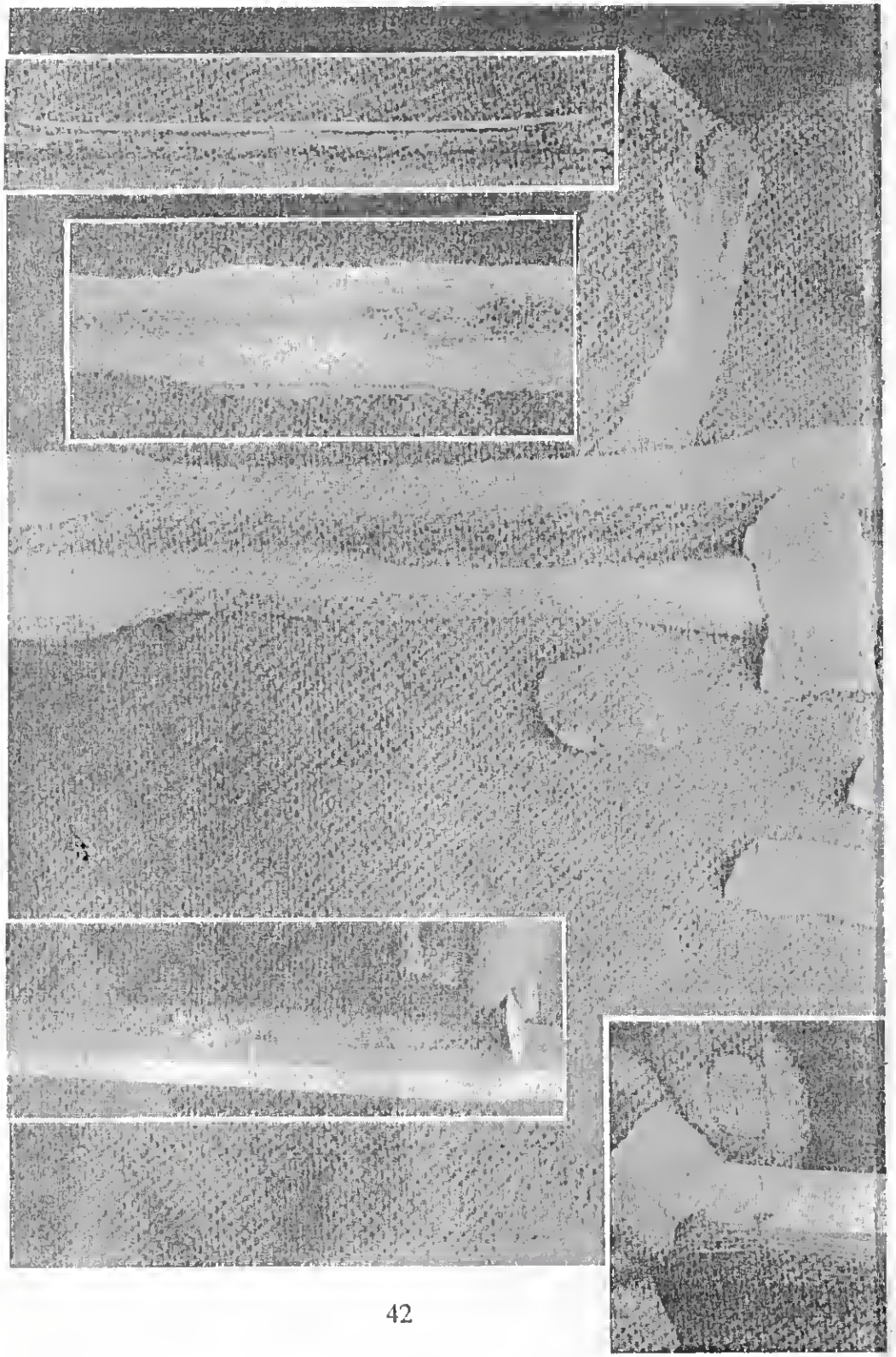
TECHNIQUES OF WORKING FLINT

There are three generally accepted ways in which one can predictably remove flakes from a stone. 1) *Direct percussion*, where you hit the parent rock directly with either another rock, antler or wood billet. 2) *Indirect percussion* where you place a blunt pointed tool (antler tine) at the point of removal of flake from parent rock and strike this with a billet and 3) *pressure flaking* when you place the antler (or wood) tool against the parent piece and remove a flake by applying pressure. All three methods have similar, but different, rules. Here we'll work primarily with the basic direct percussion, just touching on pressure flaking as a means of re-sharpening. Pressure flaking can also be very useful in platform preparation.

With direct percussion what we are doing here is striking one rock with another (wood/antler/bone are some other tools that can be used). Now, for what we are doing, about any rock will suffice as a hammerstone ... even the same as the core ... but this isn't recommended. The better case is to use a sand type stone, but not some crumbly old piece. It should grip the platform for just a micro-second to allow the energy to be released smoothly and yet be strong enough to take the abuse ... the hammerstone deforms as the core bites into it. The harder the flint the harder should be the hammerstone. To remove large flakes from a large nodule one needs a large hammerstone. I prefer to work with a fist sized *and smaller* hammerstone for my general work as this fits comfortably in my hand and seems easier *for me*. The smaller the hammerstone the more force necessary for flake removal and the more force



Up to now we've worked with green wood. To cure it out we now tie it (upper left top) in whatever position that we desire the final bow to take ... (this "quickie" bow procedure we learned from our good friend Jim Riggs of Oregon) ... and let it dry from several days to more than a week depending on the wood - the denser the wood the longer - in this case we let this piece of eastern red cedar ... actually a juniper ... dry for one week in our hot basement. At this point (upper left bottom) the roughed out bow is just that ... rough. But - (below left) with some little scraping, (below center) some careful cutting - here of the grip - and (below right) sanding with stone, we end up with (full page photo) a pretty much finished out piece - surrounded by just some of the flake tools used.



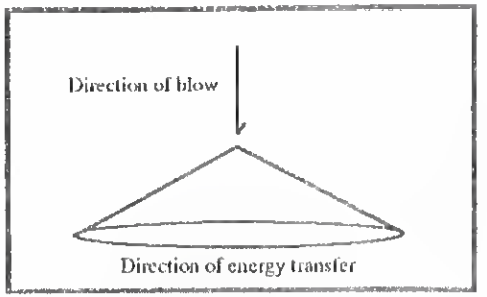
exerted, the less the accuracy. And accuracy is important. You will discover that if the rock is properly struck, the flake will separate easily.

RULES

In order for one to make finely flaked, long, thin blades, you first must learn many, many rules and have (usually) years of experience. In order for you to make the stone tool necessary to perform the functions outlined earlier you need be aware of only two rules ... and you can be turning out tools (flakes) almost immediately. This has been argued by one of the countries foremost knappers but I have proved him wrong many times. In fact after one 45 minute (plus or minus) session, there were three students out of the 15 present doing just that ... and they were on average eleven years of age! The rest didn't seem to care.

Two rules. Pay attention. Your practice will be your finished tool. Two rules (I repeat myself purposely), one more important than the other. 1) The ***cone***, and 2) the ***platform***, *the cone being the more important.*

1) <u>The cone</u> - determines how rock will break when struck. Flint breaks conchoidally ... the instant that a force strikes the surface of the flint, the energy is transmitted into a <u>cone</u> radiating at about 120°. The break in the stone pretty much follows this cone. The significance of the cone is that it determines at what angle and where you must strike a blow in order to remove a particular chunk of stone.



2) <u>The platform</u> - *is the surface that the blow is delivered to.* It must have a particular shape or the blow will be ineffective. The platform cannot be crumbly or fragile ... if so the stone will crumble when struck rather than fracture cleanly. The platform is the edge of the stone forming an angle of ***<u>less than 90</u>***°. The importance of the platform is that it determines whether or not a blow will produce a flake at all. You can beat all day on an obtuse angle (more than 90°) and not produce a *predictable* flake ... or strike a weak platform and ruin it. We will note various platforms in the following text and photos.

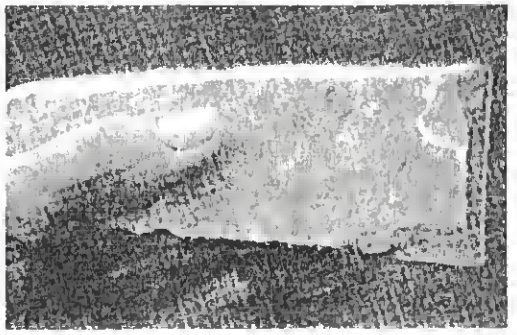
You can know only the concept of the cone and produce tools - you can know only the platform and not. Know and be proficient with both and you are what I

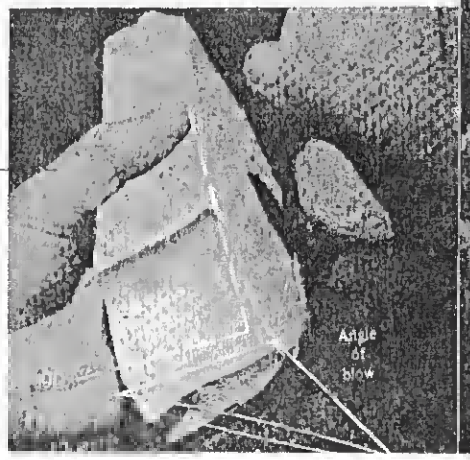
consider a flintknapper. You will be able to remove flakes from a stone in a predictable manner ... conversely, you will be able to predict what is left behind. You will be in control.

Each time you remove a flake you need to prepare a new platform for the removal of another flake from the same area. At each stage, before a blow is struck, you need to study the rock and ask yourself what must be the angle of the blow to the core to remove a targeted flake ... and insure yourself of a good, solid striking surface (platform).

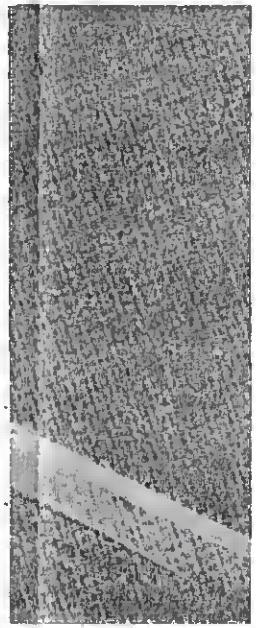
The cone ... the all important cone. All knappers are well aware of it ... it's a physical law ... you can't flintknap without some knowledge of it. There are literally hundreds of rules that one must follow in the course of advanced flintknapping ... but you will find that a good share of them are dictated because of the cone.

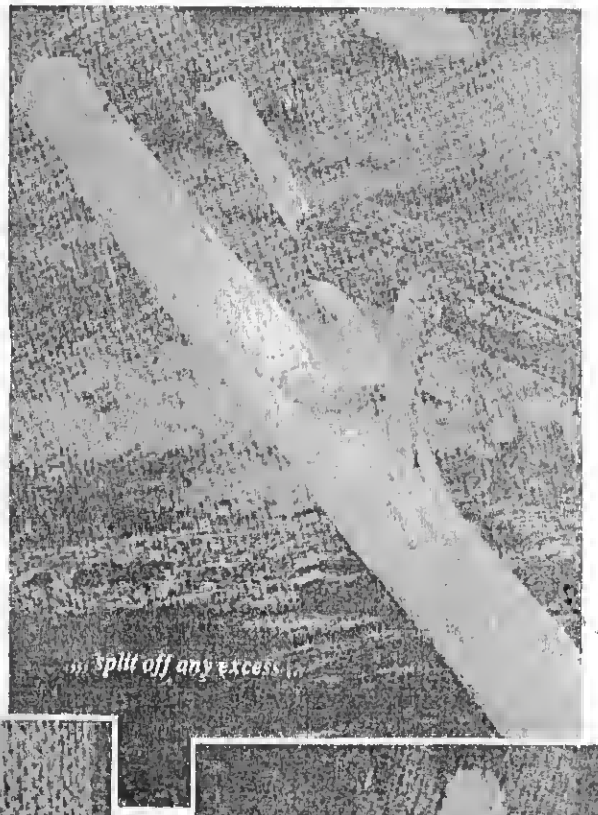
Remember, the line of force is not a straight cleavage, it is a circular cone (note photo's). This line of force, as it were, I can't stress to you enough. Once you become aware of what it is that I'm saying, a little light will go "Bingo" and you'll find yourself with a damn good comprehension of what is happening. Like most other primitive skills, there ain't no magical formula ... just regular laws of physics that once understood (along with lots of practice) will enable you to be in charge.

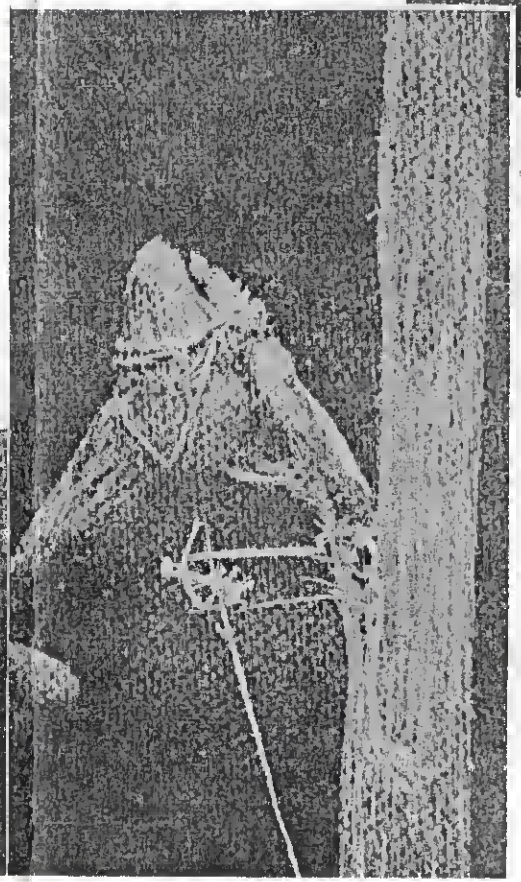


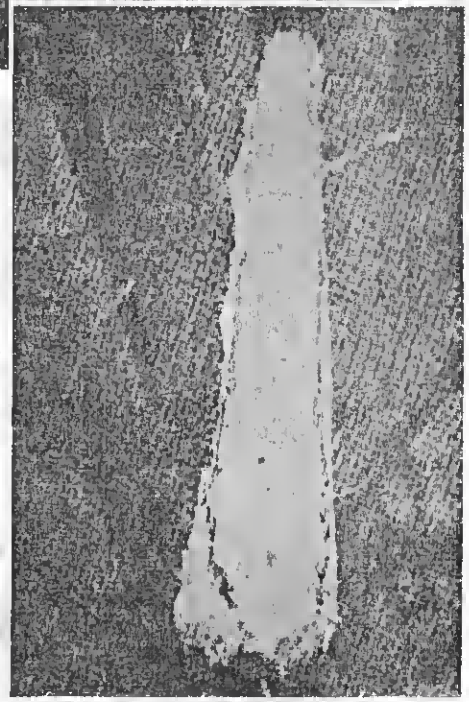


When striking a blade from a core, the natural tendency is to want to strike in line with the intended blade to be removed (dotted line) ... but ... due to the conchoidal fracture principle the energy will then go too deeply into the stone - you want it to more or less "skim the surface". Left above photo shows the lines of force - the right above one shows the results.



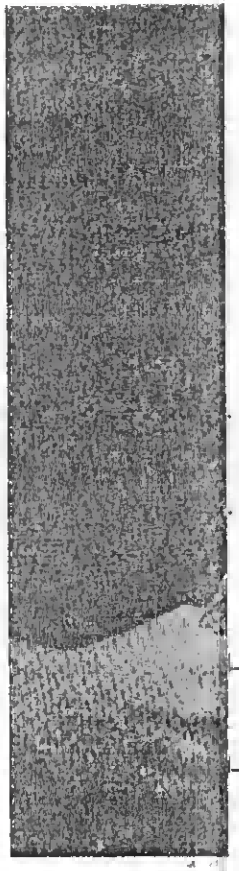


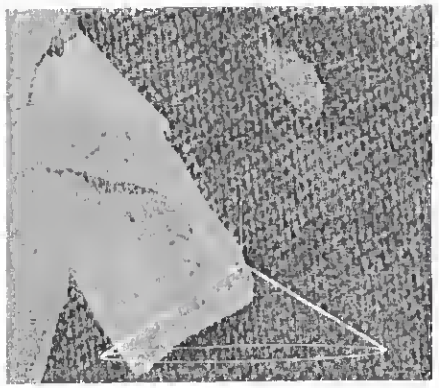


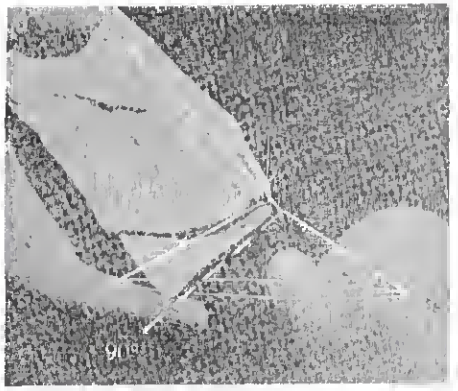


... at some point we need to line the bow out, here using charcoal.

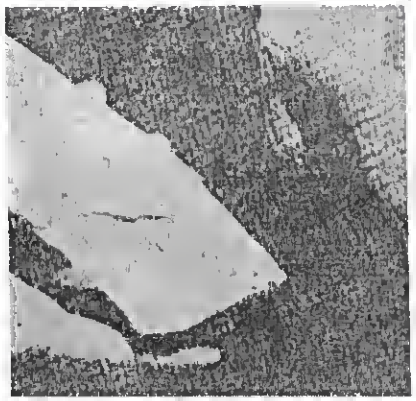
... chop to shape using either handaxe or adze ...

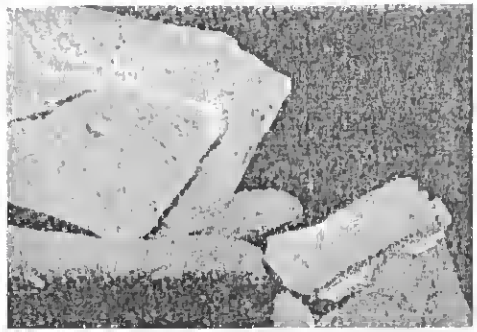


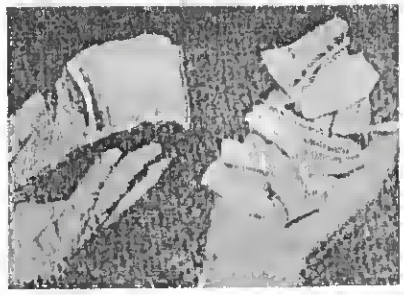




*Note the angle that the core is held in relation to the blow. Most beginners have the tendency to not compensate enough ... **it's a pretty severe angle**. Also note in the right photo how the flake tends to naturally curve outward from the cone and into the core.* NOTE THE SURFACE THAT IS STRUCK BY THE HAMMERSTONE - THE PLATFORM - IT IS SOLID WITH NO WEAK OVERHANGS.

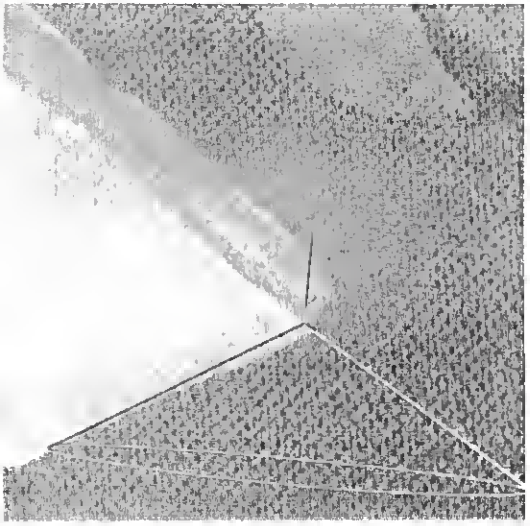


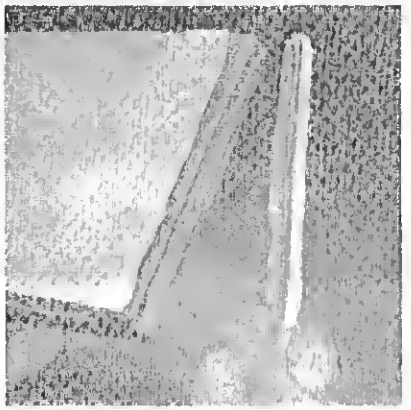




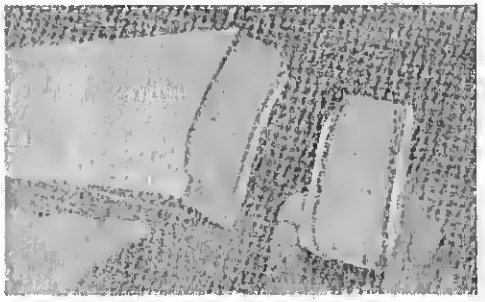
That worked so well, let's do it again. Really, this is all important. Notice that we're removing flakes from rounded areas or corners ... there's a reason for this which we'll explain shortly. NOTE ONCE AGAIN THE STRIKING SURFACE - THE PLATFORM - IN UPPER LEFT PHOTO

Note (Left) that when the angle reaches or becomes greater than 90°, the energy runs too deeply into the stone for flake removal.



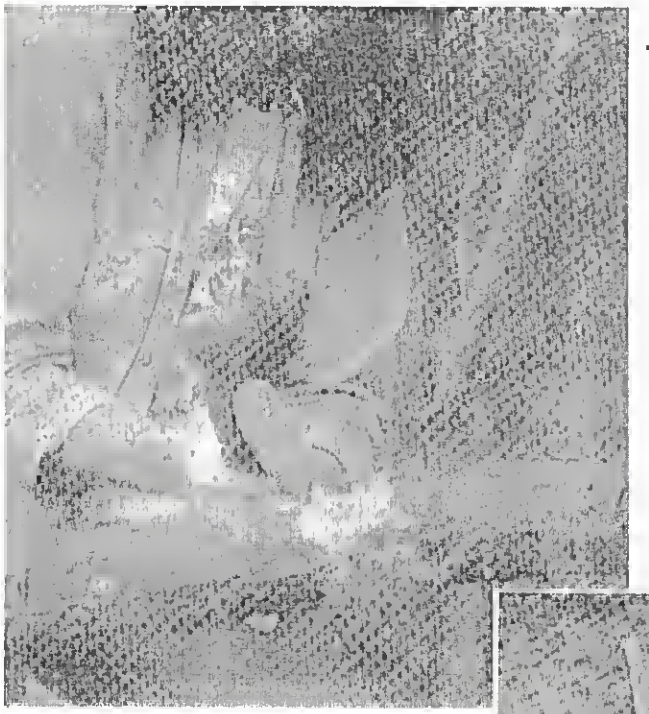


In this set of photos we'll illustrate the removal of thin and thick blades - thin for surgical slicing and thick for scraping or chopping. Note that the angle and placement of blow are the determining factors. Angle here shows clearly. Blow placement - closer to the edge for thin (above) ... further in for thicker (below).

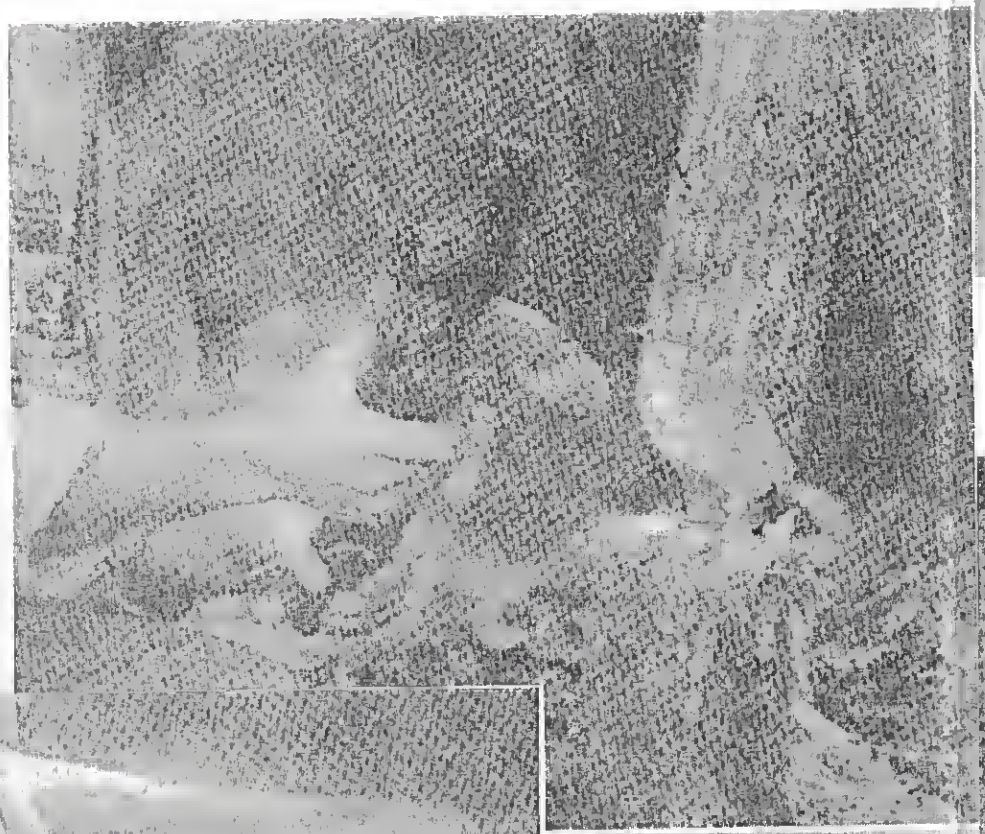


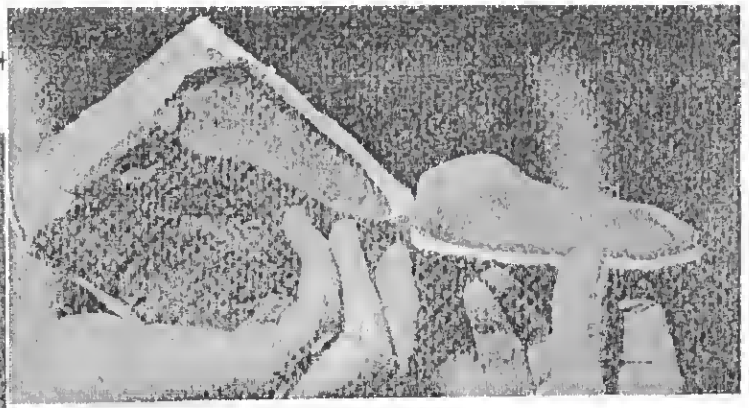
Oops! ... toa severe an angle..

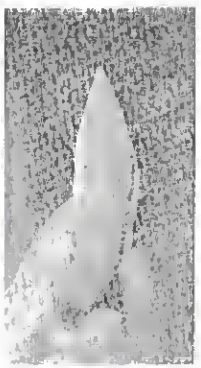
Try again with better results on the other corner.



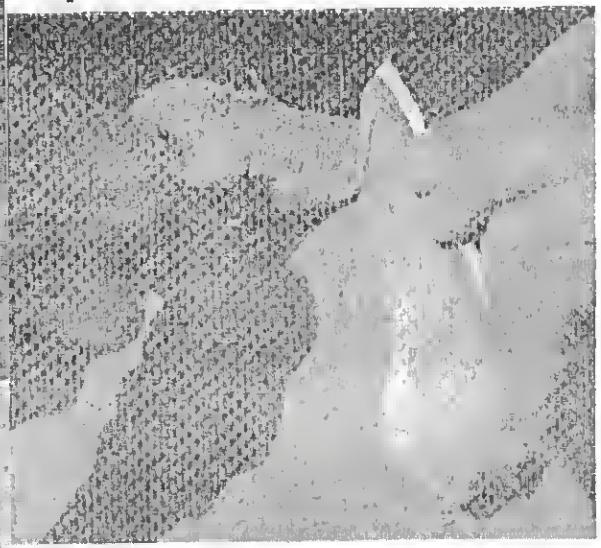
Once that you have the tools you then cut the tree down, chop it to length ... and split it.



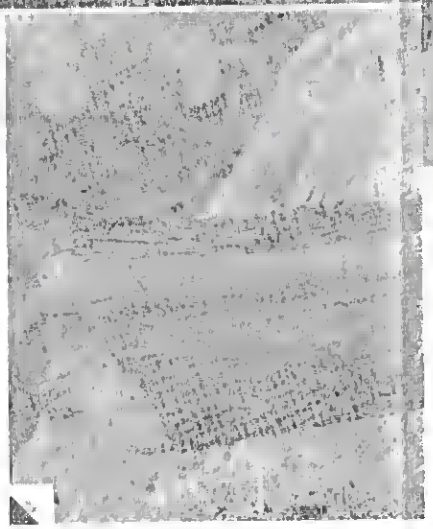


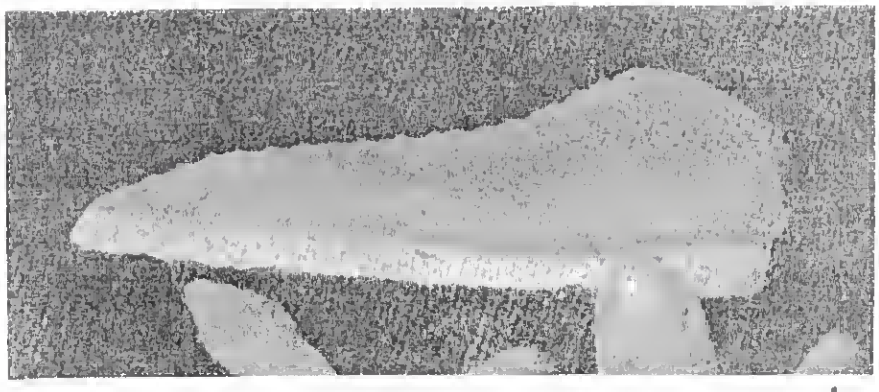


(Top left) A wide, long, thin blade is removed by striking nearer the edge but further "around the corner" into the straight plane and holding the core at a more extreme angle giving us a sharp blade (upper right) but also one which will dull easily.

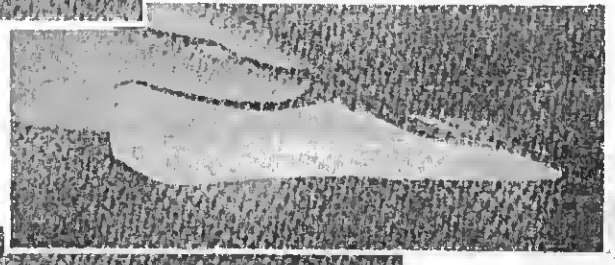


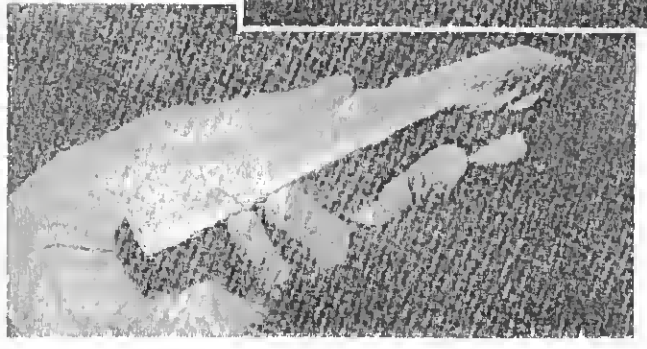
(Left) The edge is resharpened by pressure flaking, here using a rounded piece of hard, dead wood, in this case, dogwood. Pressure flaking is where most folks begin their learning of flintknapping ... where it actually is the final phase. It is, as the name implies, applying pressure to the piece until a flake pops off the opposite side. Here, in a primitive situation, wood is used. Antler or bone make for better tools. To protect the hand, a leather pad is used. (Below) The resulting sharpened edge.

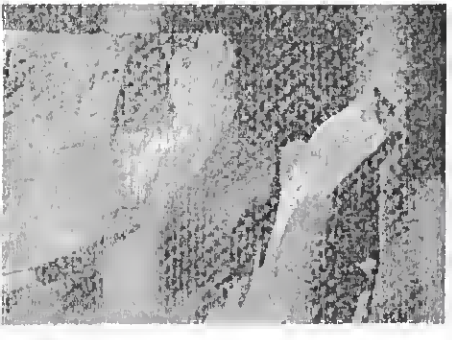


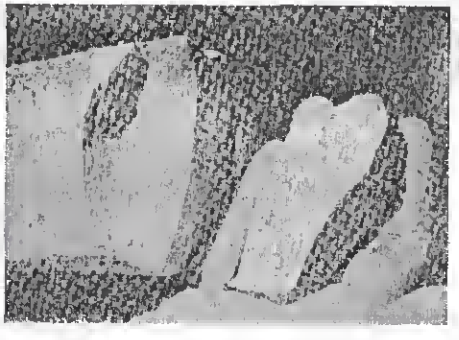


A natural lens of chert (left) ... the cortex in this instance is crumbly and so its edge is neither sharp nor durable ... so we remove a series of flakes (left) to give us a better edge (below). You will note that this particular tool is used much throughout this book on various projects.









The two photo's above accentuate well the cone shaped flake. This is accomplished by striking a bit further back *on the* PLATFORM *and allowing the energy to flow deeper into the stone* by not angling it quite so much ... *this gives a more solid edged tool for scraping, and chopping.*

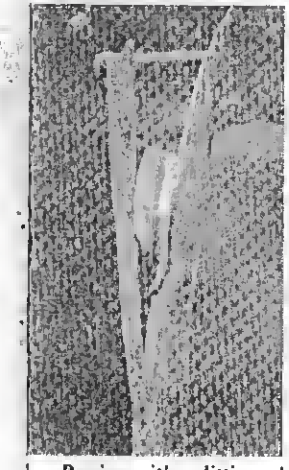
WORKING WITH THE TOOLS

Up to now in this book we have dwelt primarily with the making of tools although many also utilized some previously made ones. Now we are going to do a coupla projects which are aimed only at *using* them.

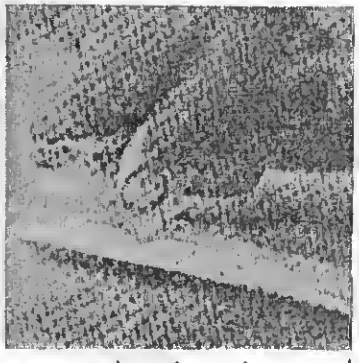
One project that covers most primitive tool usages is the bow ... so we'll head to the timber in a bit and show you how to do this with tools we have made up to now.

We stress with students the importance of being capable of heading to the wilds and making a fire (book # 2, ***Primitive Fire & Cordage***) with nothing but what is available ... something, of course, not always possible. This is what we will cover first.

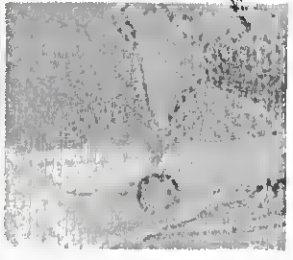
Preparing a fire board and hand drill ...



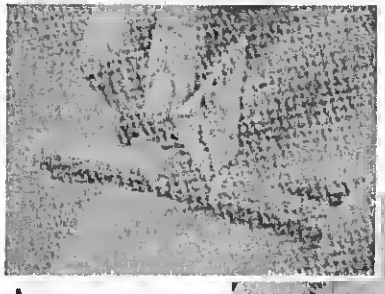
Begins with splitting the hearth ...



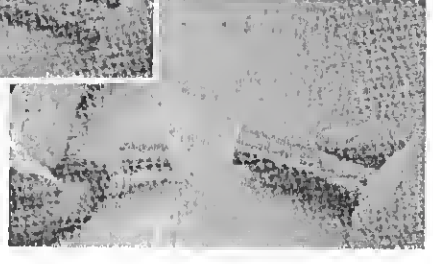
gouging a depression to start the hole ...



using a thicker blade to carve most of the notch (top) and a thinner for getting into the tight area.



Scoring drills helps to prevent their splitting ... they pop easily at the mark.



VISE

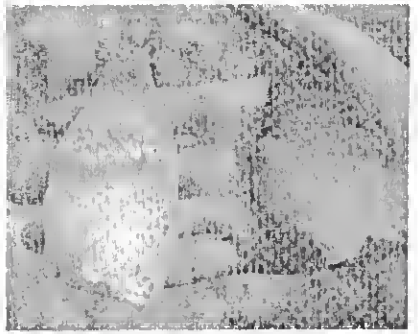
We're kinda stepping up in the world now ... a vise of all things. This trick was shown to us by a flintknapper and old time trapper from Colorado by the name of George Stewart. The one illustrated here is on a small scale and is shown holding an arrow shaft sized stick ... but this could all be up-scaled and used for bows, etc.

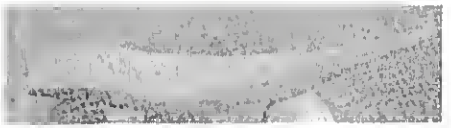
Drive a stake into the ground ...

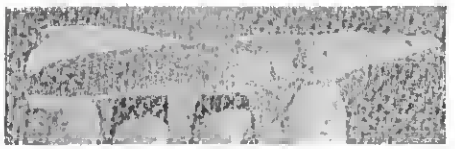
... split it down about six inches ...

... tie securely at bottom of split to keep it from opening too wide.

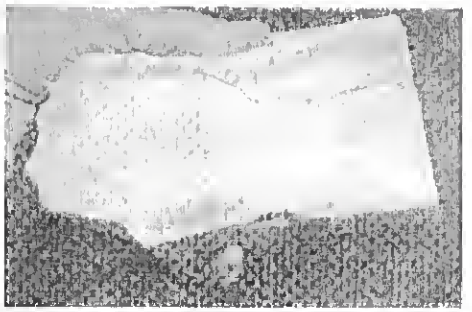
Make a loop of strong cordage near the top, insert a stick and twist it tight to hold whatever. Tie or otherwise secure the bottom of the leverage stick.

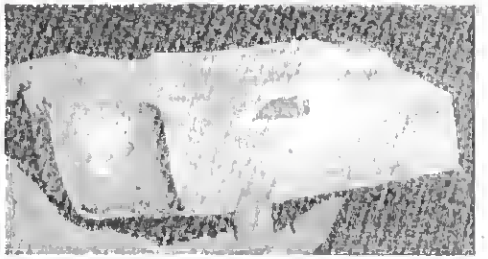






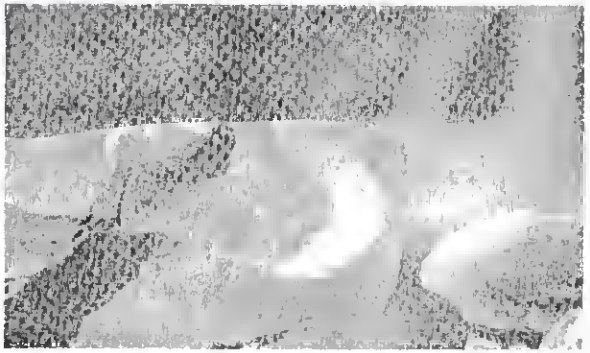
Good examples of average working flake tools. (Upper left) shows "inside" of the flakes ... the sides removed from next to the core. The lower is the end that was struck. (Upper right) Illustrates side views of the same flakes - the left side being the side "struck" (platform). Note that no lines are straight. The line of force, as it travels, tends to bend outward, *away from the line of initial force (cone) and* into *the parent rock (cone).*



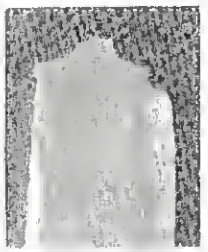


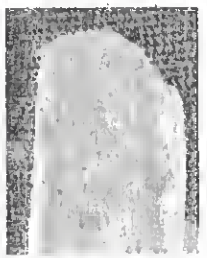
Three photo's (above) illustrate well why a corner or rounded face is necessary for predictable flake removal. The mass of the core simply holds onto the flake ... the sides won't release it ... ...tho ...

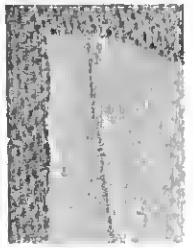
(Right) You sometimes can *call a usable blade from a straight edge.*



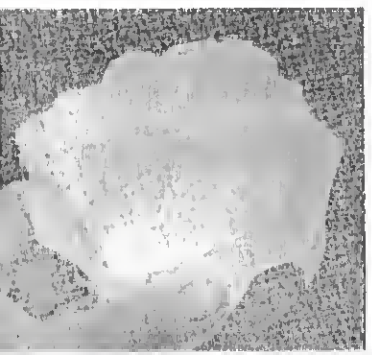
PLATFORMS

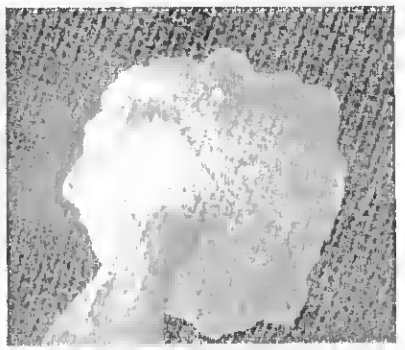




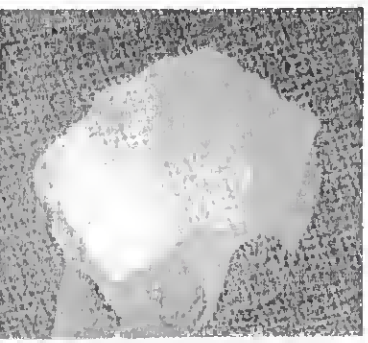


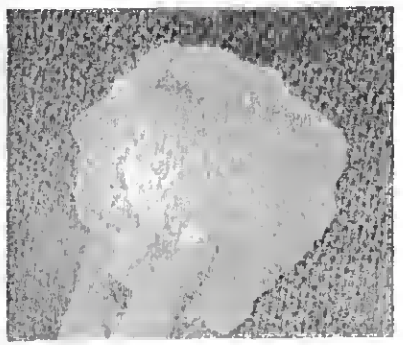
(Upper right) Unprepared platform from top and side view. Thin, weak overhang will collapse before dissipating energy properly. To clean up this weak overhang, pull your hammerstone as shown (above), (big time knappers use an abrasive grinding wheel found at the local hardware store for this - use what you have available ... oftentimes only your hammerstone) - remembering that the conchoidal principle is still at work here. (Above right) Resulting prepared platform.





Another view of platform preparation. Top unprepared, bottom ready to go.





ADZE

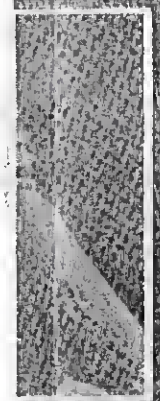
The adze is a specialized tool used for trimming and shaping wood.

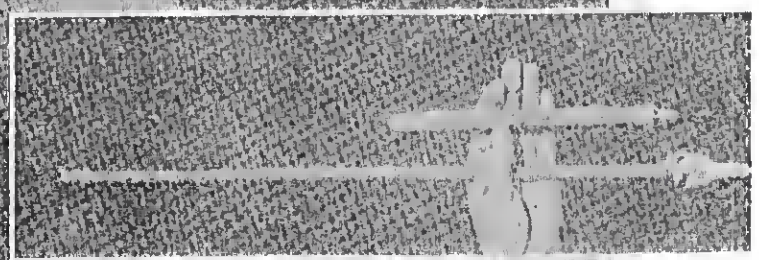
The blade itself can be made from "greenstone" and ground or flaked from flint, as here. It is mounted opposite from an axe, at right angles to the handle. Unlike the axe, the blade will be more flat on one side than the other allowing more careful removal of wood. Shown are two methods of attaching the blade to a handle.

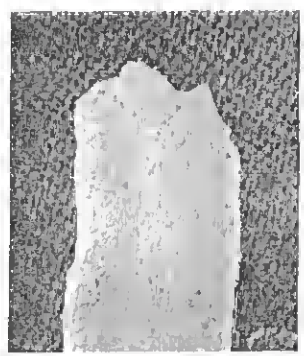
(Left inset, top to bottom) In this case the blade sits on a solid platform of the handle ... and it can break off. Here I am repairing just that by having glued the separated platform back on and lashing it in place ... then drilling a hole with a hand drill mounted with a stone point and plugging the hole with a carved piece of hardwood glued in place. The finished repair job is background photo and it has done a lot of work since.

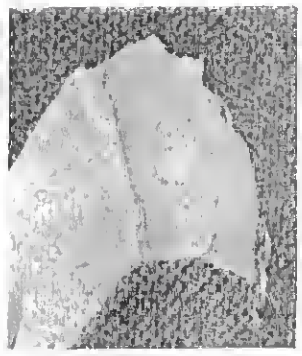
Another method of attaching the blade (lower center inset) is to wrap it in rawhide or buckskin for cushion and tying that to a flat ended handle. This works well by absorbing a lot of the shock .

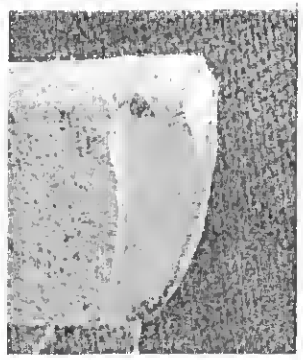
Two drills (below inset) with stone tips hafted as shown on page 33, the longer a hand drill and the shorter for use with the bow drill.

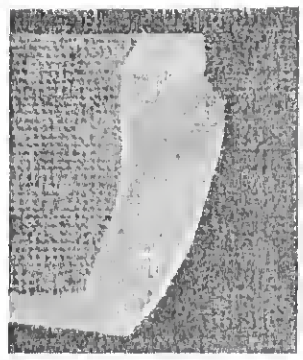




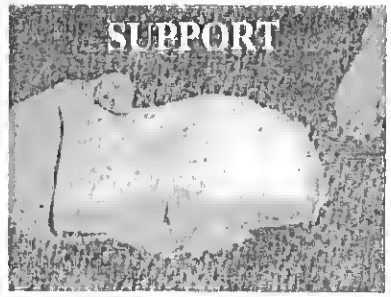








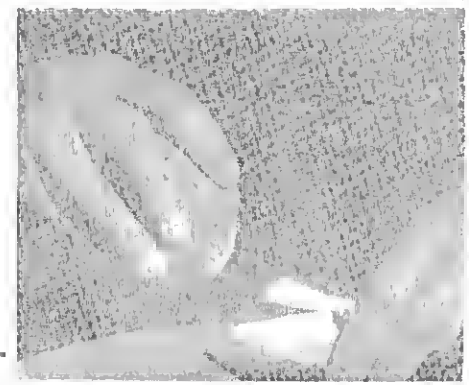
Photos (top) show weak platform. Photos (bottom) show results to expect.



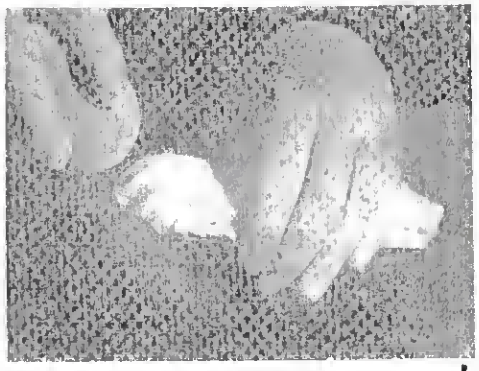
Three common ways to support a piece. 1 (Above) Here the hand is doing the supporting, tho this particular piece is almost too long for free hand support. The far end is held against the palm while the fingers hold the worked end.

2 (Right) Lay the piece on your thigh ... in this case without a pad, as would be the case in the field. Most knappers use a thick leather pad. In this photo the worked end alone is resting on the thigh while the other end is simply "supported" by the knappers other hand. The entire piece could be resting on the thigh.

We have established that when you strike a rock the energy is transmitted conchoidally - into a cone. But, there are some variances. If you were to strike a blade from an end of a long, slender piece, shock waves from the blow go traveling thru the rock haphazardly. If the rock were not supported properly, these haphazard (or maybe not so haphazard) shock waves just may snap the piece in two at the unsupported end. So, one does need to be aware of this for some of our basic work. Note photos.



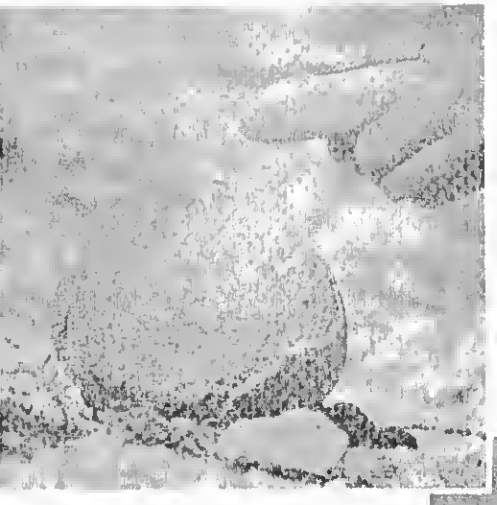
PLATFORM CON'T.

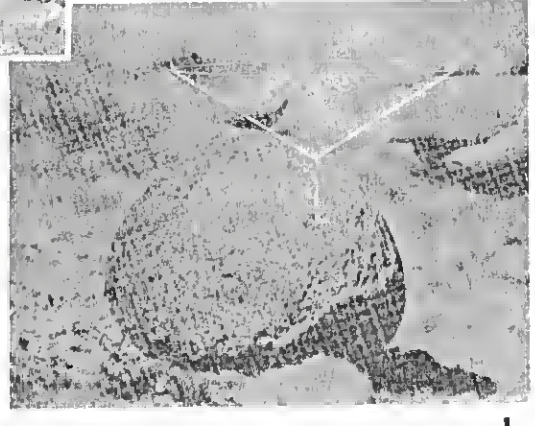


3) In this case, the worked end is free while the other end is supported by being pushed tightly into the thigh.

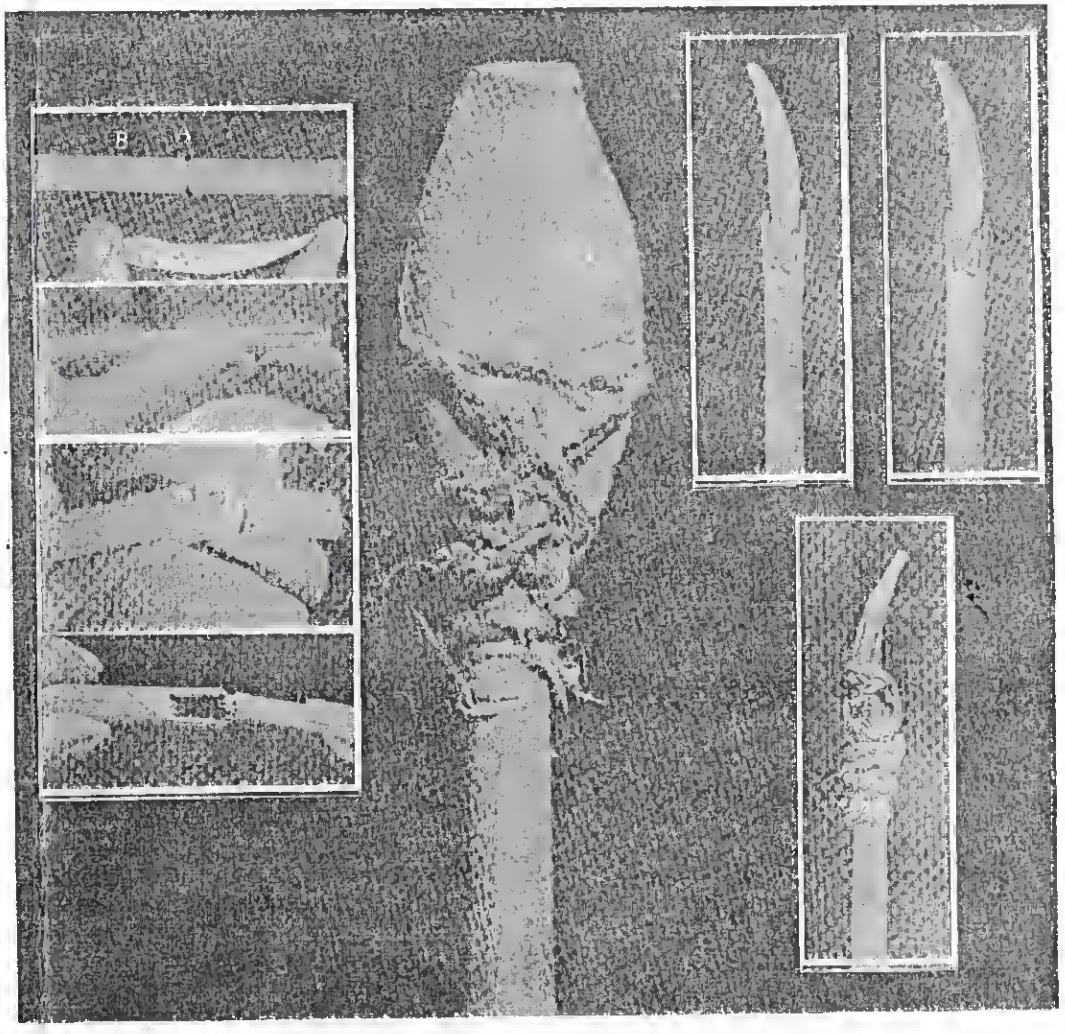
DISCOIDAL

When working with oval, flattish quartzite cobbles it sometimes is easiest to "get into" the rock or to simply remove a blade using a method taught by Boulder Outdoor Survival School and coined "discoidal". In this operation a cobble (about six inches long, 4 inches wide and 2 inches deep ideally sized) is swung onto an anvil stone (something substantially larger and harder) striking near the end of the cobble. This will remove a roundish sharp flake. This is the same concept that we have already discussed, only in reverse ... all angles the same. By using the space left from the flake removed as a platform, another flake can then be removed from the reverse side by conventional percussion ... and then another ... giving you a handy hand ax, one of mankinds oldest stone tools.



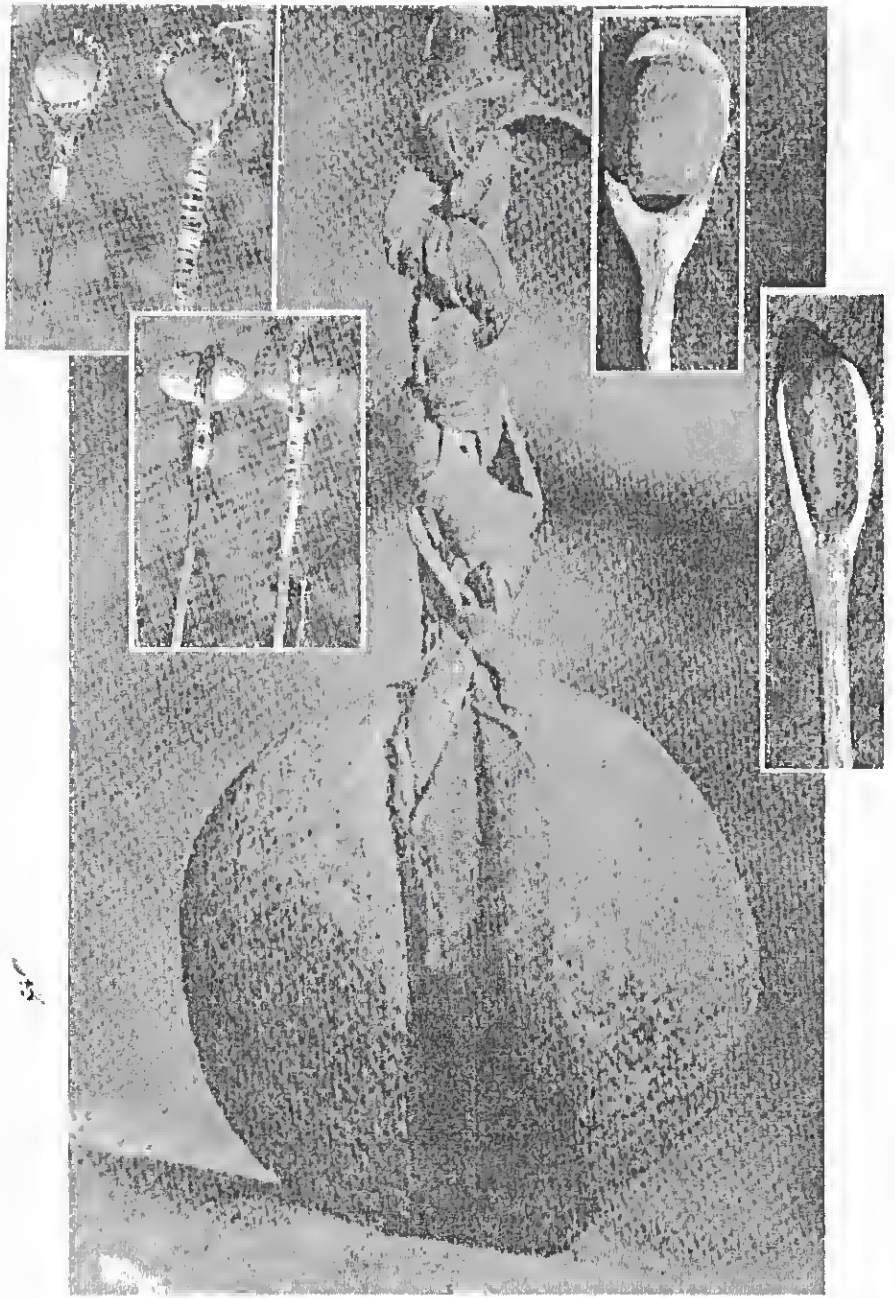


With discoidal, the flake is removed by the same rules ... only the hammerstone here is the anvil. Two tools ... the flake and the core. Utilizing the platform formed with the flake removal, a hand ax is readily created by simply removing more flakes (knives).

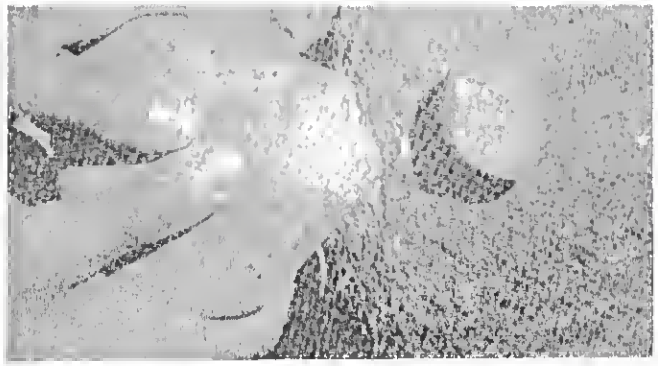


There are several ways to mount a point to a stick. You can (and we have) saw into the end with a flake - the most time consuming. You also can simply split the piece in two, carve out a channel for the blade and then bind it all together, gluing it if you have something. The easiest that we know of, but not always applicable, is this trick discovered by Larry Dean Olsen. Pay special close attention to this group of photo's. (Left, top to bottom) - 1) Blade is laid alongside shaft and notches are cut (A) leaving behind the size you want the groove to be. A thin line is cut (B) where split is to stop (depth of groove). 2) The notch is carefully split ... both sides ... to line (B). 3) Shaft is turned and the groove is "popped" out by bending in both directions from line (B). Pay special attention to where the fingers and thumbs are placed for pressure points. If you're not careful the shaft will simply break at its weakest point ... the notches. 4) The results.

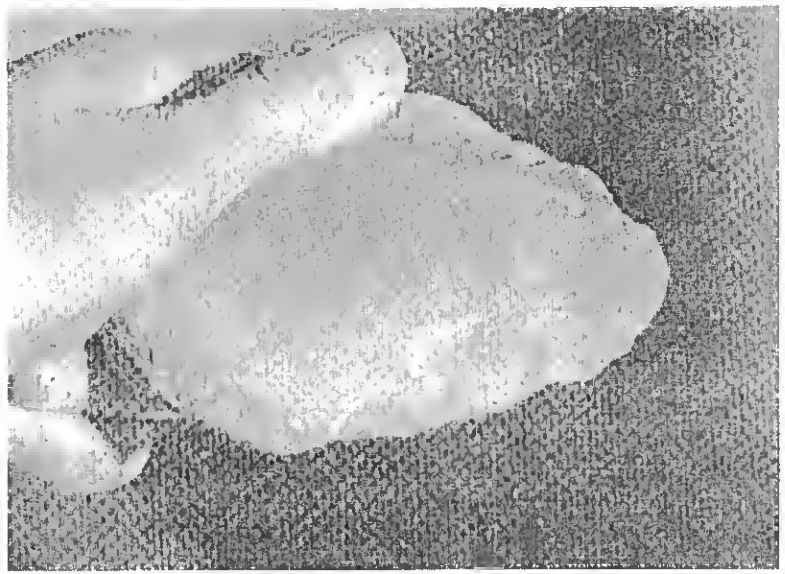
***(Right)** Once groove is made it's best to custom fit the piece, especially stone. Remember, no straight lines with stone flakes. (Top left) The initial fit ... by trimming with a sharp blade the piece is made to fit better (top right). The resulting knife (bottom) lashed into place with natural fiber cordage may not be the strongest but will still do a number of chores. Setting the piece with pitch or hide glue would really make it durable.*



Here we have hafted the "masher" (large photo) that we pecked on page 22 by simply cording heavy rawhide and wrapping it around the groove and braiding the "handle" ... stout enough for driving stakes and mashing foodstuffs. On smaller grooved hammers/axes (inset photos left) we have wrapped the handle itself around the stone ... twice on the left one and once on the right one. Most green saplings or limbs are very flexible and are made even more so by boiling or heating for a short period. They have then been held in place with natural fiber cordage ... the one on right permanently to be used as is and the one on the left to be reinforced with a light rawhide wrapping sewn on with sinew (as in inset photos right).



A flake knife tool (left) and a handaxe (below).



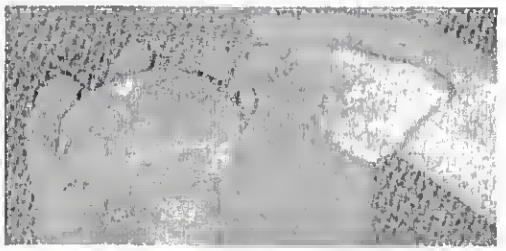
BI-POLAR

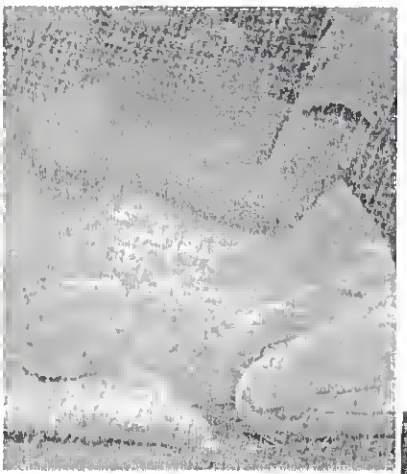
When smaller cobbles similar to those just described above are the only stone available, you are still not without a knife. By taking the flattest of these and placing it up-ended on an anvil rock, you can split these neatly in two by striking a blow on the top. What this does is drive the energy directly through the stone to the anvil and then back up. Some stones are definitely harder than others and several blows may be indicated ... watch those fingers. It's easy to smash them.

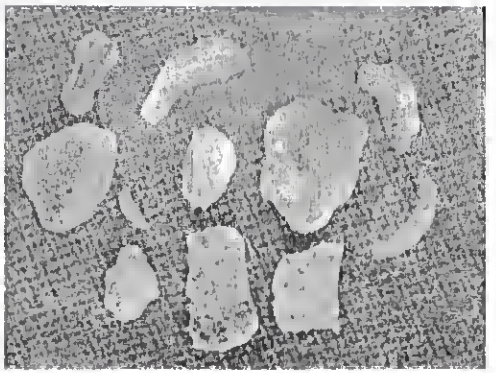
With normal percussion flake removal, an angle of less than 90° is necessary (as noted before). What then to do if all you have is egg shaped rocks? One answer is to simply throw one against another and hope for the best. But to do it like the "big boys", and retain some control, we can turn to bi-polar here also. My limited

experience with this using larger pieces (mostly obsidian) has shown that the drawings of an egg shaped rock being hit bi-polar on an anvil rock don't neatly split in two in reality. Direct your blow carefully and be certain to close your eyes just prior to contact (even with eye protection). Pieces of sharp stone can and will be flying all over the place ... but you *will* have basically two halves, giving you the beginning of a core for flake removal.

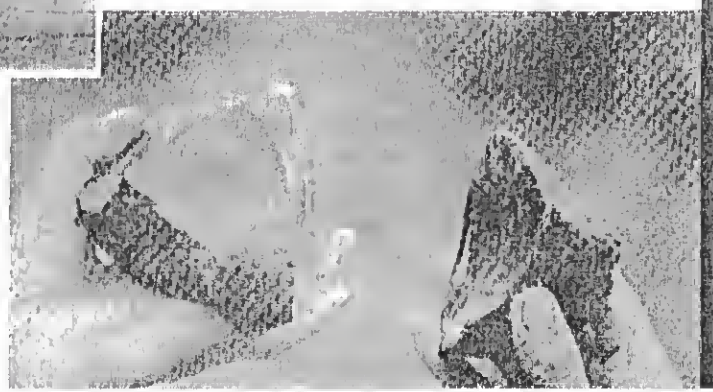
Splitting small cobble in two with bi-polar ... can be tough on fingers but is effective.

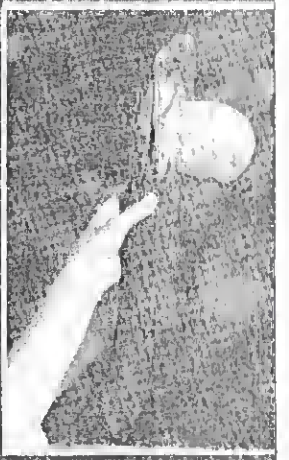






Splitting large pieces in two (above) works better on paper than in practice (above right) - though on occasion it does succeed (right).

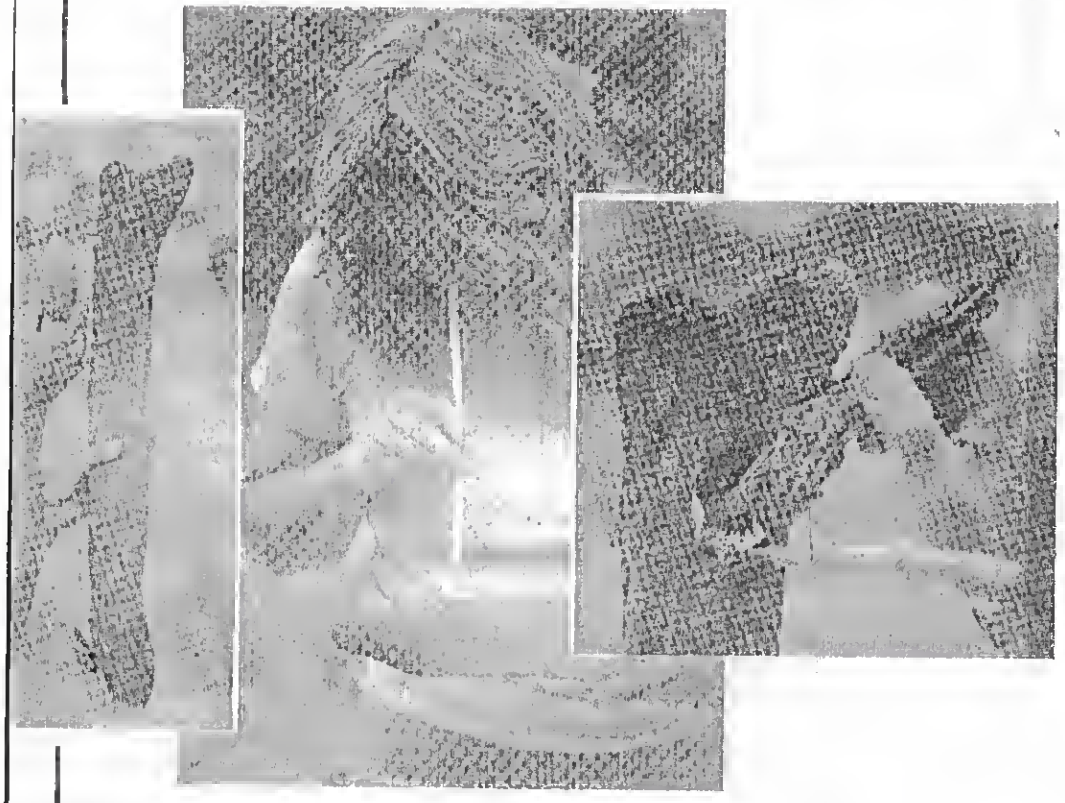




Sizing of the celt to the hole is critical. Contacts at the top and bottom must be spread evenly the entire thickness ... the surfaces flat to help prevent splitting out of the handle. I like to include a "Y" at the top of the handle as I find this stronger ... leave about two inches at the top. Some woods split easier than others and it's wise to check this out before you get four to six hours invested into making the handle (this handle took four plus hours to make). Elm yes ... cedar no. The weight of the wood is kind've important also ... the heavier making for less work when chopping. The hole is tapered as is the celt so that friction from use seats it tight. A gap of at least 1/16th of an inch needs to be left at the sides - otherwise the celt will spread the handle out thereby splitting it. [2]A special thanx here to **Scott Silsby** *for his efforts in helping me try to explain the qualities of "greenstone" ... a not so easy task.*

HAFTING

The placing of an axe, celt or other tool onto a handle can really make your work easier ... and it's not all that difficult to do once you become familiar with working with the various natural materials. Since we just made a celt, lets now haft it.



(Left to right) The roughed out handle after being reduced by fire and chopping - beginning to burn hole by placing a coal and blowing thru tube - directing the burning by blowing onto firebrand. Burning the hole can be tricky. Once the area is charred, it will ignite and burn readily. To prevent burning where you don't want to, remove the char ... the hard wood is harder to ignite. You can also place water or a slurry of clay in areas you don't want to burn. When the hole becomes deep enough, the fire starves for oxygen and one needs to blow constantly. You can burn from the opposite direction after reaching half way.

Some notes;

It is difficult to remove long flakes from a flat surface (because the energy is cone shaped and tends also to curve outwards).

Flakes will tend to follow ridge lines (certainly as there is no mass on either side to prohibit the cone from releasing).

It is difficult to impossible to shoot flakes thru a valley. The energy will stop at the far side of the first ridge and most probably hinge (abrupt line of stoppage). It is just about as hard to run a flake through a "hill" (over 90°).

Good practice is to draw the projected flake to be removed on the stone with chalk ... and then carefully study the results. This will eliminate haphazard banging (*tip from Scott Silsby*).

The ideal flake can be removed from a surface which is off a platform of less than 90° (at and above 90° the energy is shot too deeply into the "mass" of the stone), the outer surface runs smoothly with no abrupt "hills" or "valleys" to impede the energy flow, and the surface being somewhat rounded (as with a ball).

RECOMMENDED

... once you have the understanding of the concepts placed forth here, some of you will want to advance even further. The only complete book that I'm aware of that is worth its salt is **"The Art of Flintknapping"** by D.C. Waldorf. The only drawback that I know of with this book is the fact that it doesn't begin basic enough (a good reason for this book). The first time or two that I went through it I was ready to trash it ... I simply wasn't able to comprehend what it was that he was saying ... too advanced. But, once I got some basic understandings under my belt, I understood more and more. I still read it occasionally and each time pick up more. *Get it.* Another "primer" on this subject is "Flintknapping - the art of making stone tools" - by Paul Hellweg. Some sources that handle these are;

Crazy Crow Trading Post
POB 314
Denison, Texas 75020

James D. Hayden
Purveyor of fine books
88360 Charly Lane
Springfield, Oregon 97477

Three Rivers Archery
130 S. Clinton St.
Fort Wayne, IN 46802

Ne Shutsa Traders
Box 186
Haven, Kansas 67543

Three Rivers Archery
130 S. Clinton
Fort Wayne, Indiana 46802

Track of the Wolf
Box "Y"
Osseo, Minnesota 55369

Whew ... !

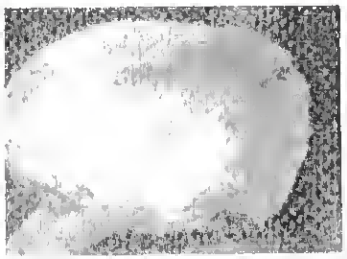
I'm sure glad that that's over with. Not that the subject is so difficult, as you have seen, but just finding the right words and putting them with the right photo's to make it all gel. So, lets proceed.

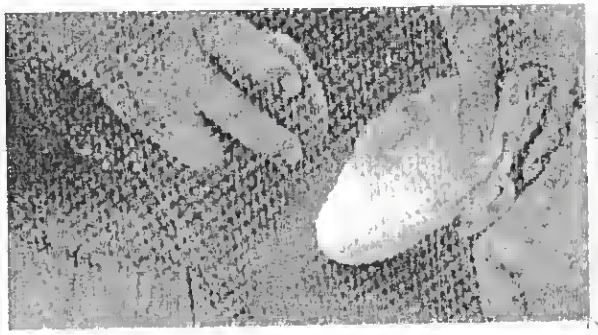
Trying to figure some sort of sequence for what follows has been about as time consuming as doing it. You'll find that much of what we are putting forward from here out ties back to our basic stone working (knapping) ... also that working with one resource requires on occasion working with another. It's that damn old *circle* of primitive technology.

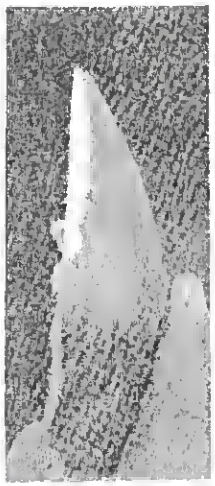
What we have done now is just kinda laid out the photo's of what we have done for this book ... and I'll write around them as they speak much better than any words or drawings. Since we have been concentrating on sharp edges, lets continue with ...

SHELL

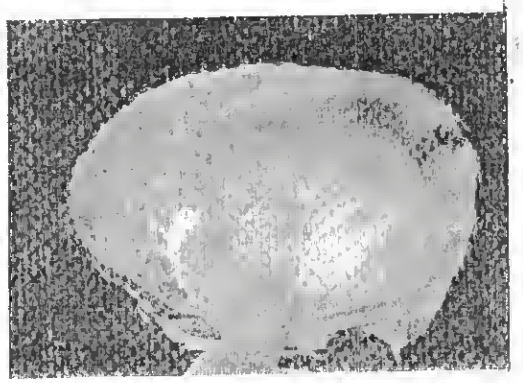
Shell, thick ones or thin ones, can be utilized in many ways as tools. Heavier ones can actually take quite a bit of abuse as choppers or scrapers but probably the most common use would be as a cutter of some sorts.





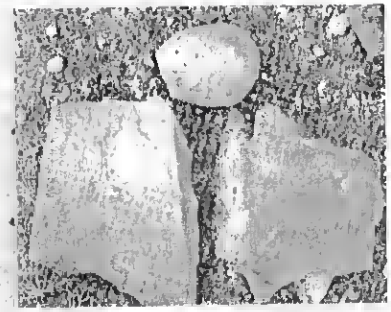


Heavier shell is here percussed with a hammerstone into a sharp, serrated edge.

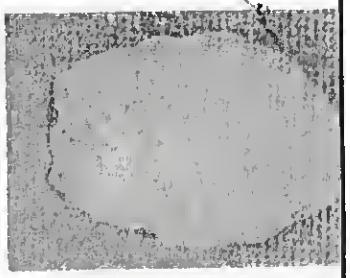


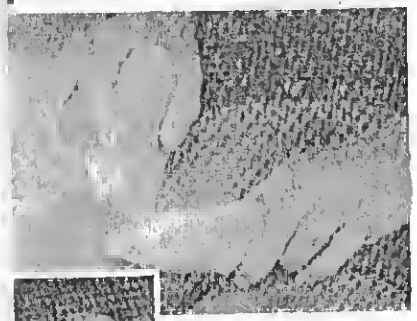
Celt

In previous pages you have seen the making and using of choppers made from quartzite and flint. Here we will show another common approach to the making of an axe ... the celt. Made from what most refer to as "*greenstone*" (its more common color in certain areas), the stone is actually a mixture of minerals (basalt, jade, and hematite are some common celt meterials... each locale has it's own). It can be found almost anywhere, located often as cobbles but also may be found in veins. The property that we are looking for is a certain degree of hardness and smoothness so that the piece will *grind* down to a sharp edge but will also take abuse. We want a hard, dense, tough rock. Several break conchoidally, which in many cases ... such as here ... helps in reduction. One test is to remove a flake, grind and polish it and then attempt to break it with your hands. Some of these stones will not flake and in this case pecking (with another, harder rock) may be in order. A knapped axe is truly functional but a ground celt will hold its edge better and so is worth the extra time spent in production. The celt illustrated here took right at eight hours to make.

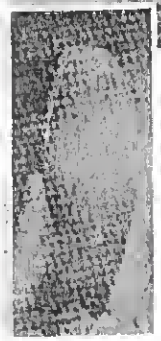


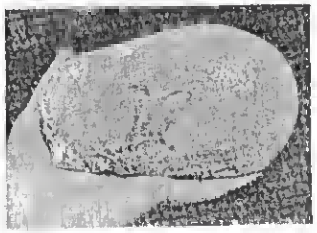
Breaking in two (left) a large lens of "greenstone" by laying it at the edge of a rock and placing a well struck (and lucky) blow using a hammerstone and then reducing by percussion (right) to a more manageable size.



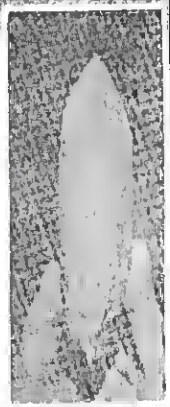


When presented with certain high areas, pecking (left) can be the solution to more quickly removing material. Most time will be spent in grinding and polishing (right) on various surfaces of sandstone.





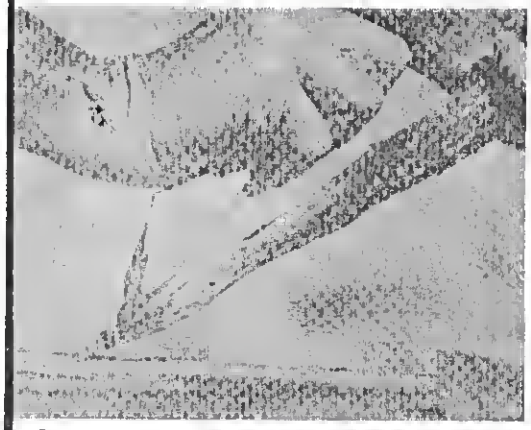
Finished celt has (left) flattish top to help prevent splitting of handle, tapering towards the rear (middle) so as to fit into hole in handle and a proper angle at the cutting edge (right) ... too thin an angle will break too easily and too abrupt will not cut as well.

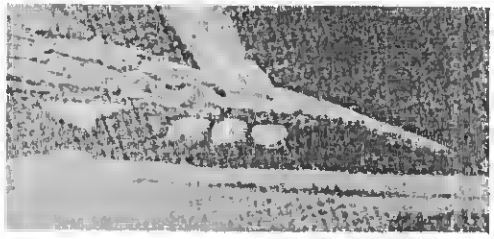


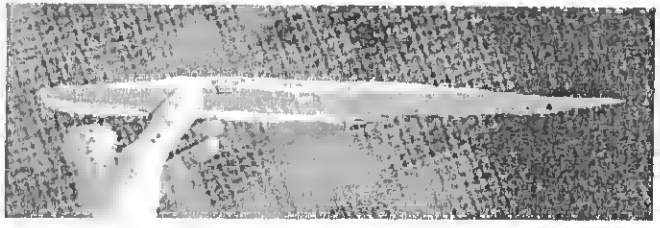
A WOODEN AWL

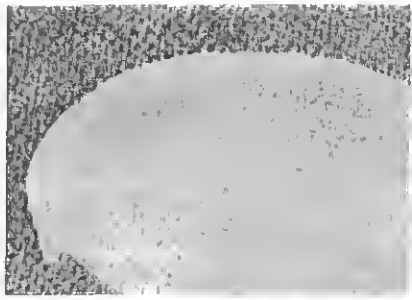
Whilst still working with wood, lets do another kinda quickie project ... again using tools to make another.

Using our trusty quartzite handaxe and wooden maul (left), we split the leftover end of our digging stick, (right) chop it to shape with a flint axe, (below left) shave it further with the sharp flint and finally (below right) grind it on sandstone to end with (bottom) a finished awl or possible needle utilizing the natural knothole.

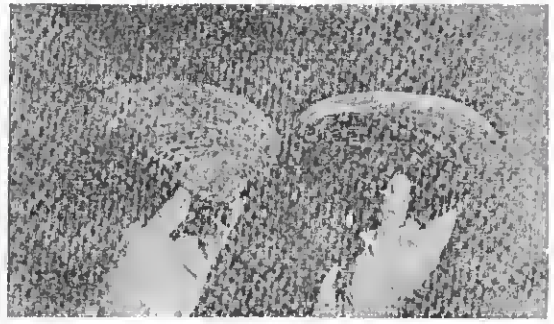




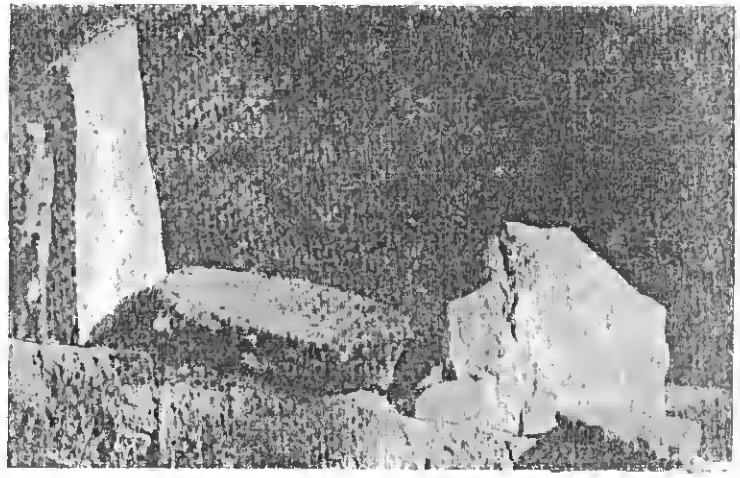




Shell here is thinner ... (Upper left) being pressure flaked to a serrated edge (upper right and right). Below is raw shell (left) and other half (right) that has simply been ground to an edge on sandstone.



SANDSTONE

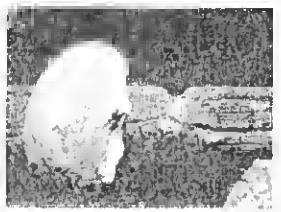


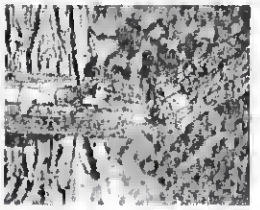
Various grits and hardnesses of sandstone are very important tools ... in the production of tools.

HEAVY BLUNT INSTRUMENTS

Lots of uses for a tool such as this ... from driving stakes to mashing nuts. Of course, the easiest is to simply grab the nearest rock or piece of wood and bash away. Here we'll refine those just a bit.

WOOD





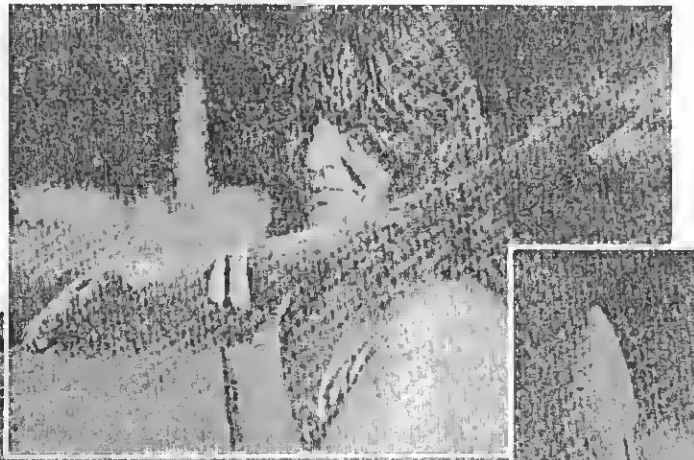
Chopping (left) with handaxe of tough quartzite, this hard piece of osage orange took less than 10 minutes to score deep enough to ... break (right) where we wanted it to. Finished club (center) has had the hand grip chopped to a size more suitable to our hands.

STONE

Rocks can, of course, be used as is. But one can also shape them to about any shape that one desires by pecking ... continual hitting with a harder rock. Not difficult, but time consuming. We illustrate here the pecking of a groove into a very hard piece of rock utilizing an even harder piece of jasper. Holding the piece in your hand or on your leg is recommended as the pecked rock may just break in two if it is placed onto a hard surface. Hafting will be illustrated further along.

... more chopping ...

... grinding on sandstone.



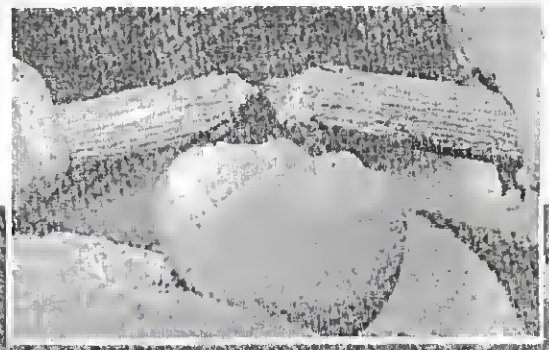
A very functional, durable, hard pointed digging stick.

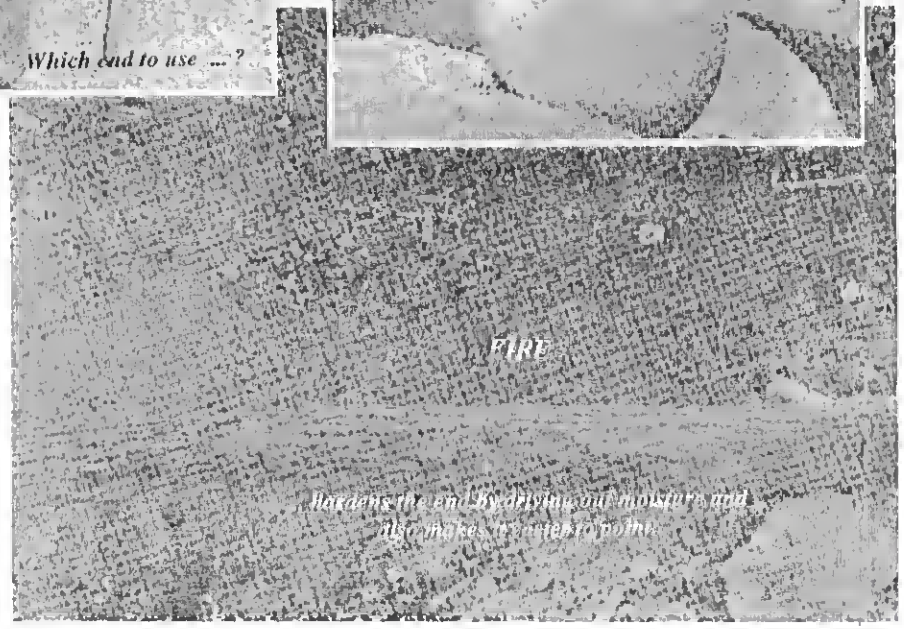
DIGGING STICK

One of mankinds' oldest tools is the digging stick ... simply a pointed stick that was used as for digging or prying. It, of course, requires the use of tools in making.

Which end to use ...?

... and then chopping ...





FIRE

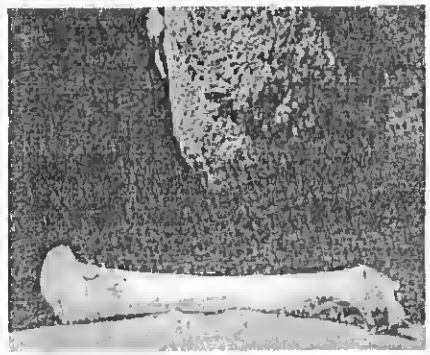
... hardens the end by driving out moisture and also makes it easier to sharpen.

BONE AND ANTLER

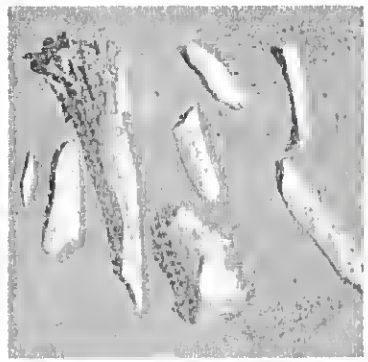
Antler, and especially bone, are common finds of any gatherer. All animals die and unlike humans, their remains are allowed to renourish the Earth from whence they came. If one can come upon them before they disintegrate, these can be dandy additions to any tool kit.

Knives, projectile points, wedges, scrapers, needles, fishhooks, and awls are just a few of the many uses of these items.

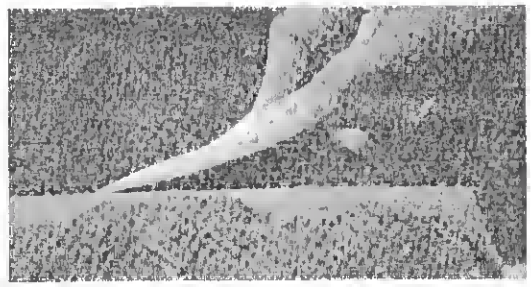
The most common and easiest way to downsize bone and antler into workable sizes for most tools is simply to bash them with a blunt instrument ... tho this is certainly not the most reliable method. If time and patience permit, scoring (cutting a line into the bone along which you desire the break to occur) beforehand can bend the odds in your favor as to which direction the break may happen ... the deeper the score the better. Some real fine, long awls and needles have come from leg bones that had been properly scored lengthways. Moist heat will temporarily soften them making scoring and cutting much easier ... tho, with antler anyhow, overboiling will weaken it considerably. Scraping with a stone blade and rubbing on sandstone will add the finishing touch and, in fact, a piece of sandstone is oftentimes the only tool necessary to finish out a piece.

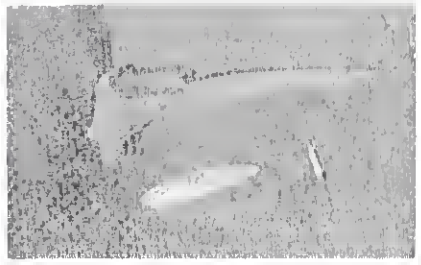


BONE



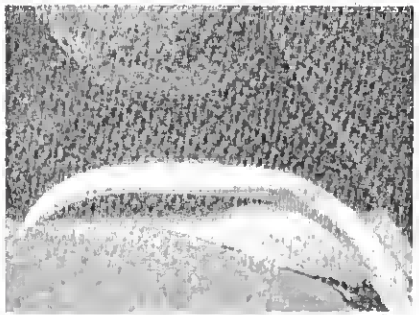
Using a rock as our basher (upper left) we reduce this deer leg bone into more manageable pieces (upper right). Some grinding on sandstone (lower left) gives us a nice awl, projectile point or knife and a fishhook (lower right). Simple bashing and grinding gave us these tools in just a matter of minutes.

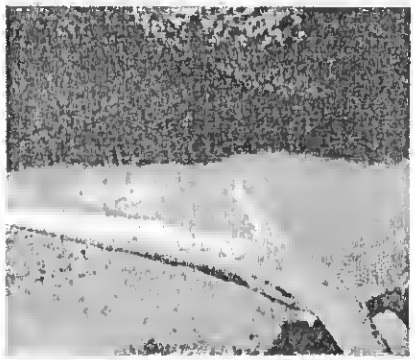


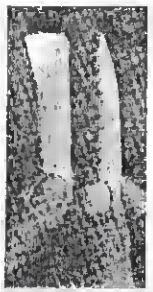


ANTLER

Antler is very similar to bone in characteristics and workability ... tho thru our own personal experiences we have found that antler is more flexible than bone and so will take a bit more abuse. Also, it seems that the molecular structure of antler is tighter than that of bone so that we can get sharper cutting edges. Horn, which we show no examples of here, seems to be even more flexible and tighter in molecular structure. (We define *antler* as the outer projection growing from the heads of certain animals such as elk and deer ... *horn* as the outer sheathing of antler on such animals as cow, buffalo and sheep.) Shown here are just a couple of examples of things to make from antler.

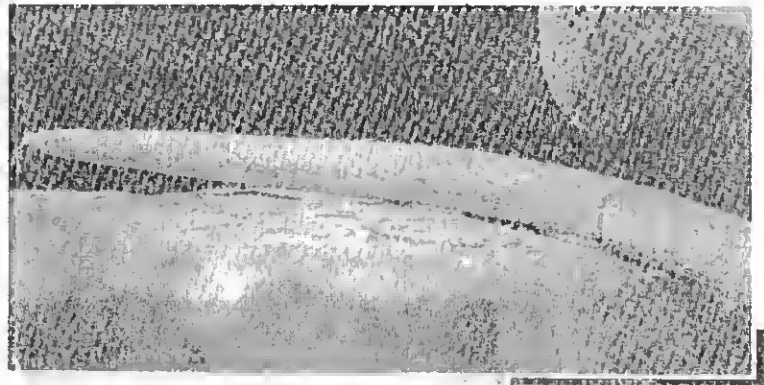






*(**Right** top) Antler from skull cap to where we just broke it ... (middle) same piece after bashing off skull cap and grinding on sandstone to make billet for percussion flaking flint. (Bottom left) shows two small wedges ar chisels and (bottom right) how it all places together.*

*(**Left** top) Wrong way to break deer antler - tip will break off, we know not where. (Middle) Better way ... note where gap wider antler is ... where it does break (bottom).*



Elk antler. (Top) about to strike with rock at score mark. (Middle) where it broke ... right at the score. The underside of the antler broke out of the score ... this could've been corrected by scaring deeper. (Bottom) what a few minutes of grinding on sandstone accomplished to turn this into a fine wedge.